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L. C. MITCHELL



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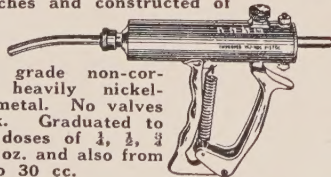
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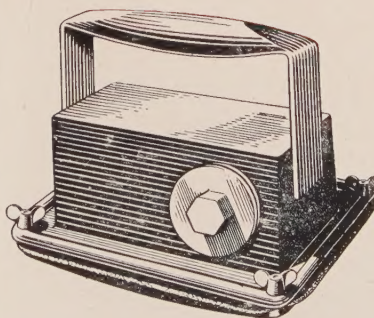


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Hon. E. L. Cullen,

Minister of Agriculture.

This month's cover



The contribution made by the sheep industry to the value of New Zealand's export produce has been steadily growing in recent years and the trend toward more intensive farming methods, the wider use of fertilisers, and improvement of pastures are reflected in the greatly-increased numbers of breeding ewes and the numbers of lambs tailed annually. In the last 30 years breeding ewes have increased from about 13 million to about 20 million and the number of lambs tailed has almost doubled. This month's cover, showing a scene on a sheep farm in the Ruatoria district, on the east coast of the North Island, has been painted by L. C. Mitchell from a photograph taken by National Publicity Studios during the lambing season. The mountain in the background is Mt. Aorangi.

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SUBSCRIPTION RATES

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KAIKOURA IN MARLBOROUGH



Lying close to the mountainous country of the Seaward Kaikouras, the coastal town of Kaikoura is the trading centre of a district in which the land is largely high-hill country suited only to sheep farming. On the relatively-small area of fertile flats near the town dairy farming is an important industry.

Aerial Topdressing is still in Experimental Stage



THE development of aircraft as a means of transport and distribution during the war has given the back-country farmer some hope that the aeroplane will be utilised to solve some of the problems associated with the farming of isolated and difficult areas. It is thought that air transport and the dropping of supplies at selected points may be followed by aerial distribution of fertiliser on a commercial scale.

The scattering of seed and the sowing of fertiliser on hill country have always been a problem and a task calling for strength and endurance as well as careful planning to get the materials on the spot. Not only are these operations costly, but the necessary labour for doing this arduous and unpleasant work has generally been difficult to obtain. Just as the lowland farmer can call on contractors with efficient spreading machinery to do this type of work so the hill-country farmer expects that the aeroplane can be similarly used not only to get his type of work done, but to reduce it in cost appreciably below that of present methods.

Before it can be determined that aerial topdressing is economical much preliminary experimental work has to be done. Some experiments have already been made, but these are preliminary to a general attack on the problem, for it is realised that special types of machines are required for most methods of distribution. Some reports of overseas work indicate that aircraft have been used successfully for seed sowing, crop dusting, and insecticide distribution, and the sowing of lupin seed by air on the sand dunes of Ninety Mile Beach has been accomplished in New Zealand. Fairly-successful experiments have also been carried out by officers of the Department of Agriculture in the spreading of small quantities of materials such as copper sulphate and cobalt from a small aeroplane. In the first experiment it was desired to topdress large areas of peat land in the Hauraki Plains with copper sulphate at the rate of 5lb. per acre and this was carried out successfully in co-operation with the Aerodromes Services of the Public Works Department. A similar co-operative trial using cobalt sulphate at 20oz. per acre was completed at the request of a farmer on fairly-inaccessible hill country within the cobalt-deficient pumice area of the King Country, though on that occasion the material was applied in a solution with water.

All these projects have added to our meagre information on the subject, but the real investigations on the economic possibilities of sowing, instead of a few pounds, 2 or 3cwt. of fertiliser per acre from the air will be possible only when a suitable type of aircraft is available for the purpose. Though there are

many varied types in the Dominion, according to authorities none of them has all the attributes necessary for this work. The Government has therefore requested Sir Leonard Isitt, Managing Director of the New Zealand National Airways Corporation, and Mr. R. B. Tennent, Assistant Director-General of the Department of Agriculture, both of whom are now in Great Britain, to investigate the possibilities of securing a plane of the necessary type from overseas.

There are a number of points on which further information is required and which can possibly be investigated in the meantime, such as, for example, the type of fertiliser which can be sown, the degree of control from the ground, and the method of spreading the material over the land. All these factors are of extreme importance, as the aeroplane, unlike normal topdressing machinery, discharges its load several hundred feet above the ground, and the material when it falls through the intervening distance is subjected to a number of forces the effects of which cannot be predicted easily. It may be necessary to manufacture a special type of fertiliser which can be discharged evenly and dropped with some degree of precision. It is not anticipated that it will ever be an easy matter for a pilot to distribute material evenly over a given area, particularly on hill country, and it is most certain that ground control will be necessary on all operations of this kind to give the pilot direction and to maintain the correct amount of overlap.

It is with the object of getting further information on such matters that an experiment has been planned in which my departmental officers will work in co-operation with the Soil Conservation and Rivers Control Council, the Air Department, and the Public Works Department. For this trial a hill-country property within reasonable flying distance from Rukuhia aerodrome has been selected in the Raglan district, and a service aircraft modified by the Air Department to carry and sow fertiliser will be used.

It should be emphasised that this operation has been planned to obtain data and will not necessarily prove or disprove the possibilities of aerial topdressing. Such matters can be decided only when a more suitable aircraft for this type of work becomes available and further tests must then be made to investigate all the details associated with the fairly-complicated organisation which aerial topdressing is likely to entail. The necessary organisation behind all phases of commercial aviation is likely to add appreciably to the cost in aerial topdressing, and though I do not wish to discourage those who, faced with the present difficulties of long transport from rail, sledging, packing, and sowing by hand, are anxiously looking for aircraft to make their work easier and cheaper, it is necessary for me to stress the difficulties likely to be faced and the fact that aerial topdressing is likely to be in the experimental stage for some time to come.

EDWARD CULLEN, Minister of Agriculture.

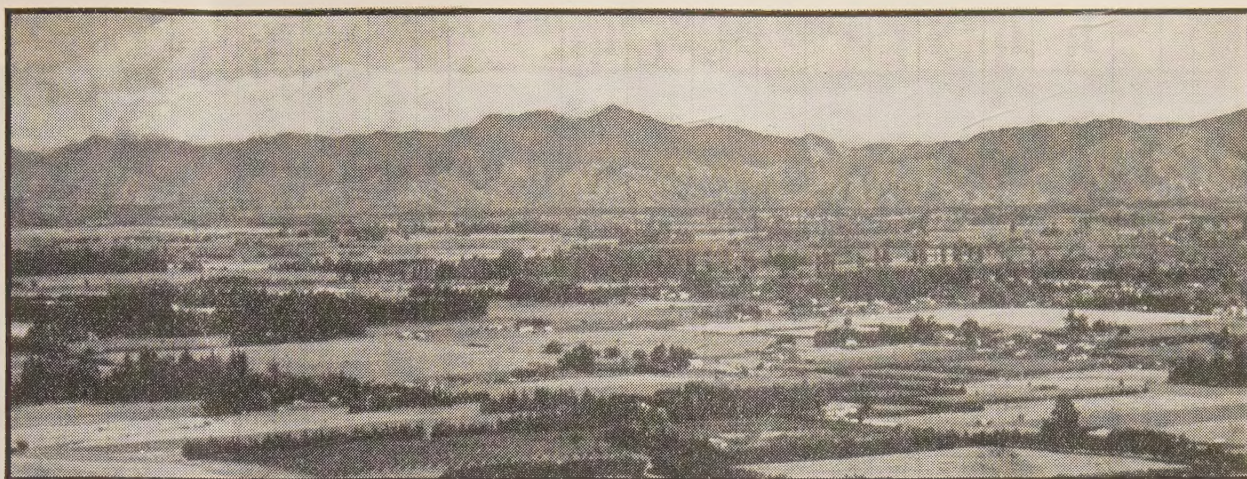
Production of Flower and Vegetable Seeds

on the Wairau Plains of Marlborough



Flower and vegetable seed growing has developed in recent years into one of the principal small-farm activities of Marlborough. The Wairau Plains district, close to the town of Blenheim, has proved eminently suited to this class of farming, and seed from this locality has a quality and germination percentage unequalled in New Zealand. The soil and climate are ideal for the purpose, the rich, alluvial, sandy loam being conducive to good spring growth and early ripening and enabling a fine tilth to be maintained through the season, and the warm, dry summer and autumn ensure the proper ripening of seed. The small-seed growing industry of the district is described in this article by S. Frew, Orchard Instructor, Blenheim.





THOUGH Marlborough's reputation as a seed-growing district has been built up through the large-scale production of clover and grass seeds and the growing of peas and onion seed in extensive acreages, the importance of the flower and vegetable seed production in the district has received little publicity. Usually these activities are sidelines in which small farmers and even housewives participate, but in some instances whole properties are devoted to seed raising, and in recent years these farms have provided a lucrative and interesting occupation.

THIS article refers particularly to Marlborough, but the common principles are applicable to New Zealand generally. The methods employed in this district, allowing for differences in planting and harvesting dates because of climate variations, should be suitable for most parts of the Dominion.

The occupation of seed growing calls for a high degree of care and efficiency, and if seed strains are to be maintained true and pure, detailed roguing and selection work must be continual. Harvesting, threshing, and cleaning require expert knowledge of the habits of each class of plant, and the normal cultural practices are as arduous as those of commercial market gardening.

Danger of Cross-pollination

One of the main problems confronting the seed-growing industry, and especially growers of vegetable seed, is the danger of cross-pollination. Two varieties of the same species of plant should never be grown in close proximity and, by mutual consent between contracting seed growers, some effort is usually made to achieve isolation of varietal areas. Those engaged in the industry are beginning to realise that its success or failure depends on the maintenance of true varietal strains, but at present there is still room for great improvement in the methods adopted to attain this object. The safe distance between plots considered necessary to prevent cross-pollination varies according to different authorities, but it is generally accepted that a minimum of 400 yards is essential, though intervention of high hedges between plots might make a reduction of this distance safe, and protection from the prevailing wind would also help.

But the logical solution to the difficulty would be the complete zoning of seed-growing areas and the prohibition of the seeding of related and wild strains of plants in these areas. Only by this means can the seed-growing industry be placed on a really sound basis.

The dangers of cross-pollination are apparent when it is realised that, for example, most branches of the brassica family will cross readily. For instance:—

[Public Works Department photo.]

The Wairau Plains district, close to the town of Blenheim, has proved eminently suitable for the raising of flower and vegetable seed crops.

Cabbage groups (*Brassica oleracea*): All the following varieties in this group cross freely with one another: Wild cabbage, cabbage, savoy, brussels sprouts, cauliflower, broccoli, kohlrabi, and all species of kale.

The swede group (*Brassica napus*) will cross with other groups, such as the turnip group (*Brassica rapa*), the Chinese cabbage group (*Brassica campestris*), and the mustard group (*Brassica juncea*).

The extraordinary variety of mutations which can result from this range is obvious, and unfortunately the results have been experienced by many commercial and amateur gardeners in New Zealand during the past few years.

Similarly, red beet will cross readily with silver beet, sugar beet, mangolds, and spinach; parsnip with wild parsnip; carrot with wild carrot; and the varieties within these groups will also cross easily with each other. Exceptions to the rule are that carrots will not cross with parsnips, though they are of related species, or onions with leeks; therefore these can be grown safely side by side.

The experienced seed grower can reduce the cross-pollination danger by growing varieties which do not flower concurrently, or by adjusting his cultural methods so that flowering does not coincide or overlap. Such practice has limits, but can be achieved to some extent by the use of early or late sites, by the prolongation of growth by manurial and irrigation treatments or by the hastening of maturity by reduction of these supplies, and by variation in the times of sowing and planting out.

Variety Improvement

Though elimination of cross-pollination will go a long way toward maintaining the strain of seed offering, only by the testing of varieties to select the most suitable and the raising of superior strains will real progress be made. At present stock seeds are not all raised under these conditions. The most reputable merchants retain their stock seeds carefully and in some instances raise the seedlings themselves before handing them over to the seed growers; in other cases that is not done, and ultimately the true variety becomes lost. With elite seeds great care is taken by most merchants to ensure that only the best is perpetuated, but with general commercial lines the methods of the seed growers are sometimes deplorably haphazard.

The work at present being undertaken by the Agronomy Division of the Department of Scientific and Industrial Research at Lincoln is therefore of the utmost importance to the seed and vegetable grower in New Zealand. By the thorough testing of varieties and strains to select the most suitable for the varied New Zealand conditions, the seed-growing industry will be in a much-improved position, provided some isolation regulations are made and enforced.

BIENNIAL-TYPE VEGETABLES

Vegetable	Seed sown		Isolation from	Special culture	Transplanting		Special treatment	Harvesting	
	Time	Quantity per acre			Time	Distance apart		Time	Method
Cabbage	June August	1lb. 1lb.	All other brassicas, 1000 yards	As for market production	August October	3ft. x 5ft. 3ft. x 5ft.	Slash hearts; rogue or harvest heads	February 12 months later	Cut fronds by hand and dry on racks
Broccoli and other brassicas	June	¾lb.	All other brassicas, 1000 yards	As for market production	August	2ft. x 4ft.	Cut out curd cen- tres and rogue	February	Cut fronds by hand and dry on racks
Carrots	October	3lb.	Wild carrot, 400 yards	Lift carefully and transplant immedi- ately	July	2ft. x 4ft.	Discard off-types and oversized roots	December- January	Cut seed heads by hand with lift. of stalk as they ripen
Par-nips	September	2lb.	Wild parsnip, 400 yards	May be trimmed when lifted	July	2ft. x 4ft.	Discard off-types	December	Three or four cuts by hand as they ripen
Red beet and other beet	December	3lb.	Mangold and other types of beet, 1000 yards	May be lifted and transplanted imme- diately	October	2ft. x 4ft.	Top young growth when 6in. high	March	Mow, stack, and thresh
Parsley	September	4lb.	Other parsley vari- eties, 400 yards	Drill in permanent rows and thin out	—	2ft. x 6in. drill row	Rogue off-types	18 months later; March	Use a header har- vester
Onions	July	6lb.	Other onion vari- eties, 400 yards	As for market; lift and store	September	2ft. rows, 9in. in row	Discard thick necks	March	Cut heads by hand with lift. of stalk; dry on racks
Leeks	September	1lb.	Other leek varieties, 400 yards	Trim roots and tops when lifted	January	2ft. rows, 9in. in row	Require warm locality	14 months later; March-April	Cut heads by hand with lift. of stalk; dry on racks
Turnips, swedes, etc.	February	4lb.	All other types of turnip and turnip rape, 1000 yards	Drill in permanent rows and thin	—	2ft. drills, 9in. in row	Top growth when 6in. high	12 months later; February	Use a header har- vester, or mow, stack, and thresh

ANNUAL VEGETABLES

Vegetable	Seed sown		Isolation from	Special culture	Transplanting		Special treatment	Harvesting	
	Time	Quantity per acre			Time	Distance apart		Time	Method
Broad beans ..	March	2 bushels	Other varieties of beans, 400 yards	Sow in permanent rows as for mar- ket produce	—	2ft. drills, 9in. in row	Rogue diseased and off-types	December	Mow, stack, and thresh
Dwarf beans, peas, etc.	November, September	2 bushels	Other varieties, 400 yards	Sow in permanent rows as for mar- ket produce	—	2ft. drills, 9in. in row	Rogue tall, spread- ing plants	March	Use a header har- vester, or mow, stack, and thresh
Pumpkin, marrow, etc.	November	2lb.	Other varieties, 400 yards	Sow in permanent rows as for mar- ket produce	—	4ft. x 4ft.	Split and extract seed and pulp when ripe	March, May	Wash seed from pulp and dry in sun
Lettuce	Autumn or spring	2lb.	Rarely crosses with other varieties	Drill in and thin or transplant	Late spring	10in. in rows	Rogue "bolters"	Summer or autumn	Cut seed heads by hand and dry them on racks
Tomatoes ..	August	1lb.	Other varieties, 400 yards	As for market produce	November	2ft. x 4ft.	Rogue off-types; pick when fully ripe	March	Ferment pulp, wash it with hydrochloric acid, rinse it with water, and dry it in sunshine

SEED PRODUCTION IN MARLBOROUGH



[Snapshot House photo.]

A block of Flower of Spring cabbage ready for the seed harvest.

There is no doubt that the system of variety testing in conjunction with zoning of seed-growing areas is a set-up which would be welcomed by growers and merchants throughout the country at present.

VEGETABLE SEEDS

Root Crops

Cultural methods: To some extent the work on a vegetable seed farm resembles that in a market garden, with one distinct variation: In a market garden the growing of crops to maturity is one season's work, but on a seed farm that often represents only the smaller part of the two-year term required. With root vegetables the seed is not obtained from the plants until the second year, so the growing of mature vegetables is only the first step in seed production. With the harvesting of these crops the specialised knowledge of the seed farmer comes into play. Whether the crop is carrots or parsnips, onions or leeks, beetroot or turnips, he must be capable not only of identifying any disease, but of selecting the roots or bulbs which truly represent the variety being grown and without hesitation culling out all sports or reverted types, retaining only the highest quality for replanting as seed roots.

First-year harvest: With onions the normal procedure is to harvest the bulbs in autumn and replant them in the following spring, but with other classes of root vegetables, such as carrots, parsnips, and beetroot, it has been found that better results are obtained by lifting and replanting them as soon as possible. Seed roots should not be overmature; three-quarter-grown carrots, for example, are considered best. The size of the roots does not appear to affect the growth and production of seed, and if the type and condition are right, smaller ones within reason appear to give as good results as larger roots.

Replanting: This replanting is a totally-different operation from the

first year's sowing. Instead of the close sowing or planting practised in a market garden, the one-year-old roots and bulbs are planted from 2 to 3ft. apart with 3 to 4ft. between rows. That enables cross-cultivation to be carried out during the growing season and allows the plants the necessary room for development of top growth and flower heads. For best results roots should be transplanted between the end of June and the beginning of August. Most classes of roots can be transplanted with a minimum of trouble or loss, but carrots require rather special treatment. Care should be taken that these roots are not injured during the process, as carrot root-rot, caused by attacks of sclerotinia, may cause heavy losses during the second growing season. If extra-long roots are being planted, they are better set at an angle than planted perpendicularly. (A recent Russian report states that this carrot root-rot can be largely controlled by treating the roots with a bactericide before replanting them; that might be well worth trying in New Zealand.)

Topping: Usually the top growth of beetroot and crops with similar foliage is headed back early in the growing season to encourage the formation of an increased number of shoots instead of one main stalk. The seed-bearing growths are thus increased and harvesting by mechanical mowers made possible, the mower being able to sever the lighter shoots, whereas the thick main stalk would require cutting by hand.

Spraying and cultivation: As insect pests and fungus diseases are likely to be even more troublesome on vegetables during the second year's growth, when healthy top growth is essential, a regular and thorough spray programme must be maintained. Inter-row cultivation requires close attention throughout the growing season, and irrigation may also be necessary during a particularly dry period.

The "one-season" method for root crops: An alternative method of producing plants in this class for seed is practised in England and other parts

of the world. Instead of seed being sown in the normal autumn or spring period, sowing is delayed until mid-summer and the small plants ("stecklings") are planted out in the following spring. This method is considered to reduce losses through root diseases, and the period during which the crop occupies ground is reduced considerably. It is even possible to eliminate transplanting by this method, but this system is still only in the experimental stage in New Zealand and commercial growers have not yet adopted it. A disadvantage of the system is that the roots do not grow to mature size and therefore cannot be rogued for off-types.

Brassicas

The two-year plan necessary for root and bulb vegetables can often be reduced for brassicas. Many varieties of cabbage and cauliflower plants raised from seed sown in autumn can be planted out in early spring and a crop of seed harvested the following autumn.

Early seeding is sometimes induced in cabbages by making incisions in the developing hearts, slashing through the centres with a large knife, but results are by no means certain and frequently the cabbages will merely develop further small heads—really an indication that the strain is good and free from early seeders or "bolters." These heads may be cut as market garden produce and the plants left in their established positions for a further season, when they revert to true biennial behaviour and produce their seed in the normal way in the second year.

Broccoli and cauliflower seed more readily, but to assist the development of seed fronds it is preferable to cut out the centre of the curd while it is still firm and compact. That allows air circulation, prevents possible rotting of the curd centre, and permits the reduced number of fronds to come away more sturdily. As with other classes of horticulture, it is better to produce a limited crop of good quality

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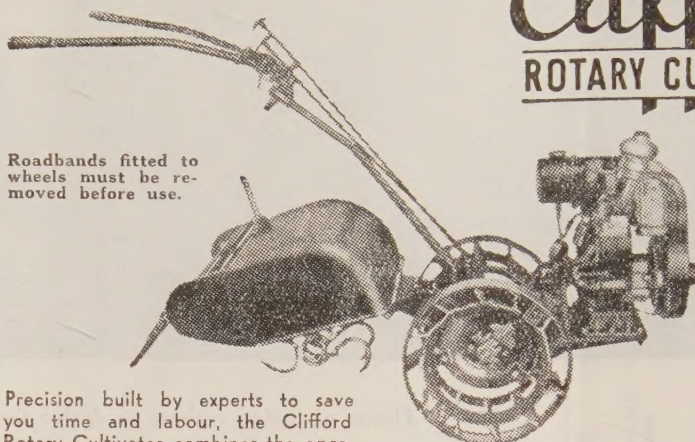
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than a larger amount of inferior quality. The resultant seed fronds will grow large and spreading, so, as with the other classes of vegetables, plants should be widely spaced.

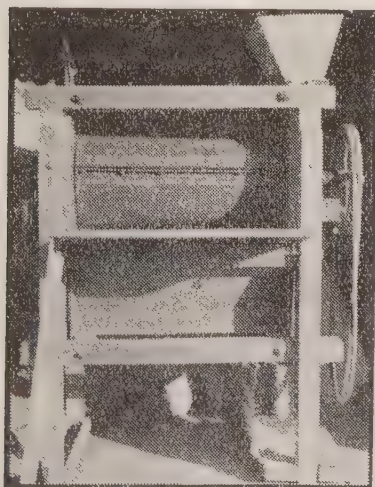
One-year Seed Crops

Simple one-year vegetable seed crops are obtained from peas and beans. Grown as field crops, their culture would be similar to that of market gardening if it were not that only during the one growing season does the opportunity for roguing occur, and the seed grower must scrutinise his growing crop carefully and cull out the off-types. Peas and beans are usually grown under contract, and the purchasing firm will ensure the minimum of trouble by supplying reliable original seed, but the work of roguing must be maintained continually.

Tomatoes, pumpkins, marrows, and cucumbers are also one-year seed crops and are grown as for market garden produce. Occasionally insufficient pollination will cause trouble with marrows and cucumbers and, to ensure fully-fertile seed, pollination of the female flowers by hand is frequently necessary. It should be done about midday, using a soft brush to transfer pollen from the male to the female flower.

Harvesting Vegetable Seed

Harvesting begins with the picking of parsnip seed, the first vegetable seed to ripen in a normal season. Beginning during the Christmas holidays, this is a tedious job which carries on until the end of January. The correct stage of maturity for harvesting is of very short duration. Within three days of ripening, seed will start to fall and, with only this narrow margin on which to work, harvesting calls for a high degree of skill and diligence if a full crop of mature seed is to be



[Snapshot House photo.]

This machine for cleaning carrot seed is also suitable for some flower seeds. Fed into the hopper at the top right, the seed passes through the perforated cylinder, in which wire brushes revolve, and emerges through a chute on the left.

SEED PRODUCTION IN MARLBOROUGH



[Snapshot House photo.]

After being mown and dried, the cabbage seed fronds are fed into a stationary harvester.

obtained. As the seed does not ripen evenly all over the plant, no quick method of mechanical harvesting is possible and hand picking must be resorted to. It is usually done with a pair of secateurs, about 1ft. of the stem being cut off with the head. The first seed to ripen is the top centre flower head, or "crown," usually the best and heaviest seed in the crop. With the second cut, usually about a week later, the pickers are able to take the next three seed heads. A third and final cut is made about 10 days later, when the best of the remaining seed heads are gathered. Occasionally a fourth cut may be warranted, but only with particularly well-grown plants in a favourable season.

The lower and smaller heads which make up the balance are usually discarded, as they comprise mainly small, light seed of low germination. In fact, these lower laterals could with advantage be removed entirely early in the season, thus diverting all the plant vigour to the portion suitable for harvesting.

The harvested seed heads are then spread on racks to dry. Wire-netting racks in tiers are erected either in sheds or under suitable cover for this purpose, the lowest rack in each tier being covered with a canvas sheet to catch the falling seed. This method has proved most successful, and very little subsequent threshing is necessary.

About three-quarters of the seed, including nearly all the best and heaviest, will fall from the heads as it dries. Any threshing necessary to free the remainder is done with flails while the seed heads remain on the racks. The seed is then removed from the canvas sheet, sieved to eliminate waste matter and undersized samples, and bagged for delivery to the merchants.

The principles of parsnip seed harvesting are followed fairly closely with many other classes of vegetable seeds. Onions, leeks, cabbage, and carrots all go through the process of hand picking, rack drying, and final cleaning. The cleaning of carrot seed, however, causes considerable extra work, as it requires a final polishing to remove the seed hairs. That is accomplished by passing the seed through a perforated hollow cylinder in which wire brushes revolve. The seed emerges from this appliance completely dressed and ready for bagging. Leek seed also can be put through this cleaning machine with advantage.

Uniformly-ripening Crops

Vegetable seeds which ripen reasonably evenly over the whole plant cause much less trouble in harvesting. Usually such a crop is cut by a tractor-driven mower, and very little of it is now stacked subsequently. Crops such as beans, beetroot, and parsley are mown and allowed to lie in the paddock until they have dried, and are then threshed by being fed



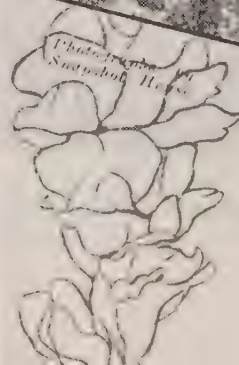
ANTIRRHINUM CROP

Above—Seedlings in boxes in a heated glasshouse. Upper left—Young plants pricked out. Lower left—Plants being hardened off in cold frames. Below—Plants being lifted from the frames to be planted out.



FROM SEED TO SEED

Above—Planting out in the field.
Upper right—Cultivation of the
growing plants. Lower right—
The block in flower and ap-
proaching the harvesting stage.
Below—Harvesting the seed by
picking individual flower heads.



SEED PRODUCTION IN MARLBOROUGH . . .

into a header harvester as it moves across the field. As seed must be fully matured before being harvested, this method necessarily results in the loss of a proportion of the seed during operations, but it is considered that the speed and economy of handling more than offset this loss and provide the most economic way of handling these crops.

After the seed has been cleaned and dressed it must be stored in a dry place until delivered to the market; usually clean new sacks are used for this purpose.

Removing Seed from Pulp

Seeds of plants such as tomatoes, marrows, and cucumbers, which are embedded in pulp, require rather more trouble to extract. The most satisfactory method with the marrow family is to cut the flesh into halves when fully ripe, remove pulp and seed, and place it in a sieve; the seed can

then be washed clean with a hose, and dried on a sheet in the sunshine.

Tomatoes should be picked when fully ripe and placed in a glass or earthenware container for two or three days to ferment. Not only does this assist in freeing the seed, but recent work has shown that this fermentation controls the seed-borne organisms that cause bacterial canker. The seed can then be washed on a sieve and spread on sheets of glass to dry. Alternatively, hydrochloric acid at the rate of 1 pint to 22lb. of fruit can be added to the pulp and stirred two or three times. After half an hour the pulp can then be placed in a sieve and washed with a hose. The seed will come free from the pulp and can then be spread on glass or a cloth to dry.

Final Preparation

All the seed thus prepared for the merchant is still not ready for the market. The merchant has a further

dressing and cleaning to do, and a germination test must be applied before the seed is ready for disposal through ordinary commercial channels. The weights supplied by the grower are sometimes subject to considerable reductions before the final crop return is assessed.

Healthy, well-harvested seed usually germinates uniformly. Irregularly-germinating seed should be avoided if possible, even if the final percentage of germination is fairly high. The interim report from the seed-testing station discloses the vigour as well as the germination percentage.

Size of seed has some influence on the vigour of the seedling plant. The bigger seed, because it has greater reserves of food, gives a stronger seedling. Numerous experiments have been carried out to find if the use of large seed increases the yield of crops and, though opinions are not unanimous, it is generally considered that the bigger seed gives an advantage, particularly in plants which have a short life.

FLOWER SEEDS

Cultural Methods

The initial work of vegetable seed growing resembles commercial market gardening and, similarly, the flower seed grower's work is often akin to that of the glasshouse nurseryman. With many classes of flower seeds, especially half-hardy annuals, propagation of plants is begun under glass, the seedlings being sown in boxes and afterward pricked out into fresh boxes. Later they are hardened off under cold frames before being planted out in the field. All this work is a trade in itself, illustrating the complex knowledge the commercial seed grower requires.

With annual flowers this glasshouse work must be undertaken each year, but with perennials, once the initial beds have become established, new areas can be planted out merely by the dividing of existing plants from offsets or, in the case of plants such as pansies, by the striking of soft green cuttings.

Half-hardy annuals: Sown in a glasshouse during winter, plants are ready for setting out in the field by October. The area to be planted out must be well prepared beforehand. A good dressing of blood and bone (4cwt. an acre) plus lime (1 ton an acre), thoroughly incorporated in the soil, is a standard mixture for most varieties of flower plants. After a final cultivation to eradicate weed seedlings the plants are established in rows sufficiently wide to allow for inter-cultivation, usually with 2ft. 6in. between rows and 1ft. 6in. between plants. As much cultivation as possible is done mechanically, but considerable hand weeding and hoeing appear indispensable.

Hardy annuals: A few varieties of flowers, mainly hardy annuals, are established with far less trouble, being sown directly into the field during spring. Godetia, sweet peas, and lupins can be established satisfactorily in that manner, and asters so dislike transplanting that they are treated in the same way, with successful results.



[Snapshot House photo.]

Delphiniums nearing the harvesting stage. The one on the left is ready.

FLOWER SEED PRODUCTION IN MARLBOROUGH



Flower seed heads drying on canvas racks in a shed. As the pods burst, the seed is scattered over the canvas, and little threshing is necessary. [Snapshot House photo.]

Treatment of Established Plants

Pinching back: Nearly all varieties will flower more profusely if pinched back early in their growth. With some varieties it also pays to remove the first flowers and concentrate on harvesting the better blooms later.

Spraying: Occasionally spraying is necessary. Delphiniums are particularly liable to mildew and antirrhinums to septoria spot. Rust and leaf spot affect many other varieties in an unfavourable season.

Roguing and selection: To this spring and early-summer work of cultivation, spraying, topping, and deblossoming must be added the all-important work of roguing or selection. Roguing consists of eliminating all undesirable plants and selection comprises marking the most suitable types to ensure perpetuation of the strain for the grower. Seed from these selected plants is harvested separately and forms the stock seed for sowing in the area the next season. Where propagation of varieties is accomplished by dividing plants or striking cuttings, the retention of a good fixed strain is simpler, the complexities of cross-pollination are eliminated, and the aim of roguing is the improvement of variety strain rather than merely its retention.

Pollination: With shy seed-bearing varieties such as polyanthus-primrose, and pansies, hand pollination is sometimes resorted to, but, fortunately for the seed grower, most classes need no assistance in pollination and, provided a small apiary is run in conjunction with the property, most flowers will produce their seed by normal pollination. The humble-bee plays a big part in the pollination of the pansy, which with its deep-seated stigma remains inaccessible to the honey bee, but is fully fertilised by the attention of the humble-bee. However, in a district

where large areas of clover are grown the humble-bee usually deserts pansy beds for the clover fields as soon as they are in flower, usually in mid-December, and during this period hand pollination of pansies becomes necessary.

Harvesting

Flower seed harvesting in general is more laborious and painstaking than harvesting vegetable seeds. With the

exception of sweet peas, which may be mown and treated similarly to vegetable peas, harvesting flower seed is all hand work, and with most varieties seed heads must be picked daily as they mature.

Maturity for picking occurs in most cases after the petals have fallen or withered and when the seed pods have developed fully and changed colour. The most convenient and least costly method of harvesting is to cut the whole plants close to the ground, tie them into small sheaves, stook them for a short period to ripen off the seed thoroughly, and then thresh in the usual manner, but that system results in the loss of a large proportion of the seed. Harvesting when the bulk of the seed is ripe means that most of the earlier-ripening seed, and usually the biggest and best sample, is lost, and some of the later-developed seed is still immature.

Therefore, for best results from a valuable crop it pays to hand pick individual seed pods of flower heads as they ripen, and in New Zealand crops are usually harvested on that principle. Secateurs are commonly used for the purpose, and pickers are usually supplied with light, rigid containers, similar to apple-picking bags, to hold the harvested seed pods or flower heads. With flowers which persist in retaining their dead petals while the seed matures—for example, asters and calendulas—the whole flower head must be picked.

Drying and Threshing

The final ripening of the seed is done preferably in a warm, dry place such as a covered-in shed, where the stems are not fully exposed to the sun. That ensures the slow drying necessary in order that the seed may absorb all the nutriment from the



[Snapshot House photo.]

The winnowing machine for flower seed. The lever on the side regulates the weight of seed allowed to pass through.

FLOWERS

Flower	Propagation		Subsequent treatment	Transplanting		Special treatment	Harvesting		Subsequent treatment
	Method	Time		Time	Distance apart		Time	Method	
Antirrhinum	Sow under glass	June	Prick out into cold frames	October	2ft. 6in. x 1ft. 6in.	Pinch back young growth	January, March	Cut stems by hand	Dry on racks; no threshing
Asters	Sow in field	August	Thin to 6in. apart	—	2ft. drills	Pinch off early flowers	March	Pick flower heads	Dry under glass and thresh
Delphinium	Divide roots	July	Replant immediately in well-limed land	July	3ft. x 4ft.	Stake plants	January, March	Cut stems by hand	Dry on racks; no threshing
Dianthus	Sow under glass	May	Prick out into cold frames	September	2ft. x 1ft.	Treat as annual	December, April	Cut whole top growth	Dry on racks; use flail
Godetia, clarkia, etc.	Sow in field	August	Thin to 6in.	—	2ft. drills	Pinch out early flowers	January	Use a header harvester	—
Russell strain lupins	Sow in boxes	July	Prick out	September	2ft. 6in. x 1ft. 6in.	Treat as annual	March	Pick seed heads by hand	Dry on racks; use flail
Marigolds	Sow under glass	June	Prick out into cold frames	October	2ft. x 2ft.	Pinch back early flowers	March	Pick flower heads	Dry under glass and thresh
Pansies	Sow in beds or take cuttings	Autumn	Spray for mildew	August	2ft. 6in. x 2ft. 6in.	Pinch out early flowers; hand pollinate after December	December, January	Pick seed pods by hand	Dry on racks under glass; thresh and sieve
Sweet peas	Sow in field	June	Treat as field crop	—	2ft. drills	Rogue off-types	January	Use a header harvester	—
Salvia	Sow under glass	August	Prick out into cold frames	October	4ft. x 4ft.	Cover for frosts	March	Pick seed heads by hand	Dry on racks
Stocks	Sow under glass	June	Prick out into cold frames	August	2ft. 6in. x 1ft. 6in.	Pinch out early flowers	February	Pick pods by hand	Discard top pods as "singles"

The isolation required for most varieties of flowers is 400 yards.

stem. The seed pods are spread on a canvas, and as they burst the seed is scattered over the sheet; little threshing is necessary.

With flowers such as asters and marigolds extracting the seed is more difficult. The old, laborious method of cutting the petals off individual flowers and letting the seed pods ripen is obviously tedious and uneconomic, and the modern method of drying the flower heads on racks and then putting them through a carrot seed-cleaning machine has proved entirely satisfactory and a great labour saver. The flower heads are fed into the machine when the petals have reached the brittle, dry stage. The revolving wire brush in the perforated cylinder effectively crumbles petals and seed casings to dust and the seed emerges free and ready for the final cleaning.

Final Cleaning

The operation of final cleaning is common to all flower seeds. It consists of first sieving the seed to eliminate most of the dross, and then passing the seed through a mechanical cleaner or winnower. This is a simple apparatus with a fan to blow off the dust and light seed. Capable of adjustment for the varying weights of different seed, this machine may be set to cull out all foreign matter and ensure a clean sample of any type of small seed.

Seed thus prepared is then ready for delivery to the merchant, who, after submitting it to a rigorous germination and purity test, might have to subject it to a further cleaning before being satisfied. Usually, however, the flower seed grower's work, if carried out on the principle stated, is sufficiently thorough to pass all tests.

CROP RETURNS

Returns for seed growing show some exceedingly-high figures, though the areas in many instances are small. Vegetable seed crops may comprise units from 1 to 5 acres, but flower seed areas seldom exceed $\frac{1}{4}$ acre in any one variety. The following figures show typical production in an average year of some of the main classes of vegetable and flower seeds:—

Vegetables	lb. an acre	Flowers	lb. an acre
Onion	400	Aster	200
Parsnip	2000	Delphinium ..	140
Carrot	400	Antirrhinum ..	140
Beet	600	Pansy	75
Leek	400	Polyanthus ..	75
Parsley	400	Marigold	120
Cabbage	200	Iceland poppy ..	200

Prices paid for seeds are commensurate with their potential production. Prices for vegetable seed are lower than for flower seed, varying from 11d. a pound for parsnip to 7s. 6d. a pound for cabbage. Flower seed might return from 15s. for marigold to £16 a pound for pansy, according to variety and quality.

An average seed farm can show high gross returns, but the net figures are usually much more modest. Labour expenses are high, and to spread his season and ensure a continuity of crop the seed grower has to grow both vegetable and flower seed, both high- and low-priced lines. The vegetable crops can also provide effective shelter for the more tender flower plants if placed strategically over the farm. The average return depends entirely on the proportion of each being grown, but an average gross return of more than £120 an acre is generally expected and an average net return of £65 an acre reasonably assured in a normal season.

Seed growing is no simple occupation. A sound knowledge of horticulture and capacity for hard work are necessary qualifications for a successful grower, and a flair for flower appreciation will not only assist him in his work, but will make his occupation pleasurable as well as profitable.

Background and Development of the Food and Agriculture Organization

TO understand the objectives of the Food and Agriculture Organization of the United Nations, some appreciation of the special background of circumstances and events which brought it into being is essential. In fact, it is probably necessary to go back a century and a half or more to the beginning of the Industrial Revolution, that epoch-making event in the world's history to which no definite beginning date can be assigned and of which no close can be foreseen.

IN the eighteenth century cities were small and relatively few. The masses of the people lived and worked on the land, mostly as subsistence farmers; they produced for themselves all but a fraction of their needs. Trade in foodstuffs within a country was small and between countries negligible. Even had there been a demand, transport facilities would have been hopelessly inadequate.

Toward the end of the nineteenth century came those striking changes in manufacturing industry—improved methods of spinning and weaving and the application of the newly-discovered steam power. At the same time transport, by canal development, the invention of the steamer, and the construction of railways, completely altered the whole picture of trade and industry. These changes, which, beginning in Great Britain, soon spread to Western Europe and the United States of America, were accompanied by a remarkable population increase, thus giving rise to the gloomy prediction of the English clergyman Malthus that, as population would increase in geometrical progression—that is, would keep doubling itself—while food supply would increase only in arithmetical progression, chronic poverty and periodic famines were inevitable!

As the Industrial Revolution gained in momentum, cities and towns sprang up in profusion. Population moved from the country to the towns and continued to multiply there, creating many social and economic problems, of which food supply was only one.

Development of External Trade in Foodstuffs

The phenomenon arose of countries depending on external sources for much of their food supplies. Because the Industrial Revolution coincided with the expansion of North America and the British Dominions, and later with African expansion, these supplies were readily forthcoming, the younger countries taking machinery, equipment, and finished goods in exchange for their food and raw materials. International trade, with all its complexities of currency, exchange, tariffs, and the like, thus gradually came into being.

Technological improvements in the manufacturing industry and the development of mass-production methods enabled output to be increased manifold. The consequent increase in wealth was reflected in increased demand for a great variety of goods and services previously either completely unknown or the prerogative of the very few.

The Position of Agriculture

What was the reaction of agriculture to all this new development? To what extent did it share in the great changes going on in manufacturing industry? Considerable and even remarkable improvements were made in agricultural technique, especially in cultivation and the breeding of better strains of both livestock and plants, but it can-

not be claimed that food production underwent anything remotely approaching the changes in, say, spinning and weaving and the iron and steel industries. Increased food production was as much the result of the bringing into production of new areas as of increased yield per unit of land or of labour.

Agriculture has always been something of a problem child to economists. In elucidating their principles and theories they refer frequently to the "special case" of agriculture. Factors of production often do not move very readily from one type of farming to another or from industry to agriculture in response to marked price changes of particular products. A farmer often cannot readily reduce his production if prices fall. He has to plan years ahead, for instance, in livestock farming or fruit growing. Very often he reacts to price falls by increasing production to spread his costs over a greater output, ignoring the fact that probably millions of other farmers are thinking along the same lines and consequently further flooding an already-overloaded market. That happened in the 1930's with wheat, sugar and dairy products, rubber, meat, and other commodities; the world witnessed the Gilbertian tragedy of farmers in the Western World poor because they had produced too much, and in the rest of the world poor because they could not produce enough.

This is not the place to enter into a discussion on the merits and drawbacks of *laissez-faire*. It is sufficient to point out that, while the spur of free enterprise unquestionably has been a major factor in the great productive developments of the nineteenth and twentieth centuries, the system has carried within itself certain defects which have manifested themselves in two ways:—

First, there has been the phenomenon of food piling up in storehouses and eventually being destroyed, of farmers being paid subsidies not to produce, in a world where millions went in want, not only in the backward countries but in those very countries which were the producers of "surplus" food.

Second, and especially in the newly-developed Americas and in the British Dominions, where free enterprise inevitably meant freehold land tenure, there has been a tendency to "mine" rather than to farm the land by the use of farming methods which gave little heed to posterity. The term "erosion" is often used instead of "faulty farming," but nevertheless millions of acres of once-fertile lands have been impoverished to varying degrees and their restoration is proving costly and difficult.

International Institute of Agriculture

FAO cannot be claimed as the first organisation of its kind. In 1905 there was founded in Rome the International Institute of Agriculture (IIA), the result of a convention between representatives of 40 countries. That organisation, which by 1930 had representatives from 74 countries, may be regarded as the pioneer of official international institutions, but it confined its activities to the international sphere and its essential objects were much narrower in

concept and scope than those of FAO. They may be summarised as follows: "To collect, examine, and publish statistical, technical, and economic information about all phases of farming, including such things as trade in agricultural products, prices, wages paid for farm work, the recording of new diseases of crops and stock and, where possible, effective measures for their control; to study problems of agricultural credit and co-operation and publish available information; and, should occasion arise, to submit for the approval of the various Governments measures for the protection of the common interests of farmers and the improvement of their conditions." Thus IIA did not envisage dealing with the huge problems of over-production in the Western World and the raising of nutritional standards over the greater part of the Eastern World.

In view of his close association with the Food and Agriculture Organization of the United Nations since its inception, the Director-General of Agriculture, Mr. E. J. Fawcett, felt it not inappropriate to devote his 1947-48 annual report—part of the Department's annual report presented to Parliament recently—to a review of the background and development of the organisation. The product of the farm is the basis of New Zealand's contribution to the work of FAO, so this report was deemed worthy of a wider rural audience than it would otherwise receive.

BACKGROUND OF FAO . . .

IIA was taken over by FAO on August 1, 1946. The employees of the institute have been placed on the temporary staff of FAO, and the institute's comprehensive library of statistical data and technical information will prove a valuable asset.

First Agency of United Nations

Just as it is almost impossible to deal with the food problems of any one State alone, so it is almost as difficult to regard the machinery set up to deal with international food problems without mentioning the background of the new international machinery of which it is a part.

The United Nations came into being on October 24, 1945, when the first 29 of the 51 United Nations had ratified the charter formulated at the San Francisco conference the previous spring. This new international structure is, in reality, composed of a number of functional or specialised agencies which are international and permanent. The General Assembly of U.N., on which each of the member States is represented, elects 18 members who form the Economic and Social Council, which enters into agreement with specialised agencies operating in the economic, social, cultural, health, and related fields.

FAO was the first of these new functional bodies, coming into existence on October 16, 1945, thus preceding its "mother" organisation, United Nations, by eight days because international organisations are, by constitution, deemed to be set up when a certain number of States have ratified the decisions of their Government representatives.

In addition to FAO there are the International Monetary Fund and Reconstruction Bank, which came into existence on December 27, 1945, as a result of the Bretton Woods Agreement, the International Civil Aviation Organisation, the United Nations Educational, Scientific, and Cultural Organisation, and a number of temporary organisations set up to deal with situations arising out of the war, such as the International Emergency Children's Fund.

Problems of food and agriculture, currency and finance, trade and labour, and health and nutrition clearly are all closely interlinked, and the general plan is to co-ordinate the activities of agencies for the fulfilment of President Roosevelt's third freedom—freedom from want. It was with the object of fulfilling this great aspiration that the conference was called by the President at Hot Springs, Virginia, from May 18 to June 3, 1943.

The conference stated that two-thirds of mankind suffered from malnutrition, including a proportion of even the advanced countries, and as causes of this state of affairs it advanced the following:—

1. Insufficient purchasing power;
2. Inadequate supplies of satisfactory foodstuffs at reasonable prices; and
3. Ignorance among the public and administrators about nutritional problems.

An interim commission was set up, one of its main functions being to formulate a specific plan for a permanent organisation in the field of food and agriculture. This commission, working in Washington, drafted a constitution and produced a number of reports describing the field of work of the proposed Food and Agriculture Organization. After acceptance of the constitution had been signified by at least 20 Governments, the interim commission was able to call the first conference of the permanent organisation. In the two years between the Hot Springs and Quebec conferences the commission, with the assistance of the Governments of practically all the allied nations, did an immense amount of preparatory work, entailing not only the preparation of a constitution but also preliminary studies of food and agriculture resources in various countries and similar studies in the field of nutrition and consumption requirements.

At the conference held in Quebec in October, 1945, the representatives, after signing FAO's constitution, went on to give the new agency form and substance. They elected as first director-general Sir John Boyd Orr, an eminent Scotsman known the world over for his research work in animal and human nutrition, and who owns and has operated a large general farm in Scotland. They appointed an executive committee of 15 which chose Professor André Mayer (France) as chairman and Mr. Howard

R. Tolley (U.S.A.) as vice-chairman. Finally, they adopted rules of procedure, financial regulations, and a budget which provided for 5,000,000 dollars for the first full financial year.

Summary of Objectives

The constitution of FAO is in considerable detail, but its main objectives may be summarised as follows:—

1. To establish, by surveys, research, and collection of statistical data and other information, the proper dietary needs of the people of the world, and to provide all member nations at all times with a true and complete picture of the food situation in every land.
2. To endeavour to have the production of food in all countries correlated to the nutritional needs of the world's population to the end that eventually there shall be enough of the right kind of food for everyone everywhere.
3. To promote in all possible ways the scientific development of agricultural production and to disseminate information and provide technical services to the Governments to that end.
4. To assist in organising the world's marketing and distribution machinery for the handling of food and other agricultural products on a world basis in such a way as to ensure the delivery of these products to the people who need them in the most equitable manner, in the quickest and most effective way, and at the lowest price economically possible—that is, a price which will ensure the producer of these products a return commensurate with the costs of production, the maintenance of his production unit, and the enjoyment of a proper standard of living for himself, his family, and his workers.

The scope of FAO is much wider than the words of its title indicate, and includes fisheries, because of the food and fertilising value of fish and other sea products, and forests, because of their importance in providing shelter and fulfilling the multitude of other purposes for which timber is essential.

How FAO Operates

The general policy of FAO is laid down in its constitution, but the particular programme of work to be followed in any given year is determined by the annual conference of all member nations. Before 1947 the conference appointed an executive committee to which it delegated powers enabling it to carry out the recommendations made in conference. The third session of the conference, held in Geneva in 1947, replaced the executive committee by a Council of FAO composed of representatives of 18 nations.

The set-up of the organisation bears many points of resemblance to that of New Zealand's Department of Agriculture. The permanent head is the Director-General, who has been assisted by a Counsellor and a Special Advisor. Technical work is carried out by five Divisions—Agriculture, Nutrition, Forestry, Fisheries, and Economics and Statistics. A Rural Welfare Division is in process of formation. Each Division is led by a Director, and there are also Directors of Administration and of Information.

Each Division is assisted by a standing committee of world experts, and considerable assistance is given by ad hoc committees on special subjects such as fertilisers, waste by infection, and industrial fibres.

To some extent the work of FAO has been dictated by expediency, but the basis of all operations lies in the collection of information from member countries. Only by the accumulation and analysis of detailed information on the production, prospective production, and utilisation of foodstuffs and raw materials can FAO make recommendations and disseminate information to member Governments.

Under the constitution it is obligatory on all member countries to make periodic reports (in practice these have been annual) outlining prospects of production, imports and exports of food, raw materials, nutrition programmes, and any other steps being taken to improve rural welfare, together with the difficulties being encountered in achieving these objects.

In addition to these periodic reports, FAO frequently requests technical, statistical, and economic information from member countries in connection with specific projects. Steps have been taken in New Zealand, and presumably

in other member countries, to forward to FAO copies of all official statistics and any publications, governmental or otherwise, which deal with agricultural problems.

Information obtained from the periodic and other reports is used as a basis for conference discussions and recommendations. It also serves, with data obtained by the standing advisory and ad hoc committees, as the basis for the technical reports which FAO is issuing to assist with particular problems.

One method used by FAO which has met with considerable success has been the sending of missions of technical experts to war-devastated or backward countries to assist with the reconstruction of their agriculture. The first of these was to Greece and operated from May to July, 1946, and since then similar missions have been sent to Poland and to Siam. Small missions of technical experts have also been sent to countries requesting advice and assistance on specific problems; for example, a mission has visited Venezuela to offer advice on oil-bearing plants.

The World Food Crisis

FAO is essentially an organisation dealing with long-term food and agricultural policy and was not equipped to deal with the food emergency which arose in 1946. Hence, when early in February of that year the United Nations General Assembly called on FAO for assistance to deal with the food crisis which was looming as a result of the war and successive bad harvests, and which would be greatly accentuated by the expected termination of UNRRA, the Combined Food Board, and the Emergency Economic Committee of Europe, it was not without some hesitation that Sir John Boyd Orr agreed to co-operate as far as was within the power of FAO's still embryonic organisation.

A meeting, known as the Special Meeting on Urgent Food Problems, was convened in May, 1946, in Washington. The outcome was the setting up of the International Emergency Food Council, replacing and enlarging the Combined Food Board (U.S.A., Britain, and Canada), to allocate foodstuffs, seeds, and fertilisers on the most equitable basis possible in an endeavour to bridge the gap (estimated at the time at 10,000,000 metric tons of grain) between the supplies available and those required.

IEFC, as it soon became known, began operations almost immediately. Through the commercial section of its legation in Washington, New Zealand has had representation on several of the commodity committees. The council was intended to end its activities in December, 1947, but in view of the prolonged nature of the food crisis it was decided at the third session of the conference in September that IEFC be absorbed by the newly-formed Council of FAO, of which the former is now a committee. Its activities are now confined to cereals and to oils and fats, these commodities still being in short supply.

FAO's first session of conference was held in Quebec in October, 1945. Between then and the second session in Copenhagen in September, 1946, important developments occurred in world food problems apart from those considered at the special meeting in May. It was appreciated from the start that if FAO were to achieve anything worth while, it would have to go beyond the important but narrow sphere of issuing factual information and giving technical assistance. Throughout the war and up to this day there has loomed in the minds of farmers and agriculturists in the Western World the word "surplus." Memories still linger of the days when wheat was burnt, coffee dumped, and bonuses paid farmers not to produce; when increased production merely served to lower still further an already-uneconomic price. Not only is this "fear of plenty" a factor in retarding production, but even if this fear were eliminated, the problem would still remain of ensuring that increased production would reach those in need and at prices satisfactory to both parties.

With this problem in mind Sir John Boyd Orr issued in July, 1946, his World Food Board proposals. In the U.S.A. 400,000 fewer people were on farms during the Second World War than during the first, but because of technological improvements production was 50 per cent. greater. In New Zealand, wartime production was maintained with considerably fewer people on the land. Thus there was every reason to believe that the world would again witness that state of "poverty midst plenty" when those who had been engaged in farming were free to return to the land. Because of war devastation, political uncertainty in Europe, and the high incidence of bad

. . . DEVELOPMENT OF FAO

seasons since the war ended, production has not recovered as rapidly as was hoped.

Nevertheless, despite this temporary setback, in countries where modern agricultural science is applied the main problem is to find continuous markets at remunerative prices. To quote Sir John's report: "A relatively-small excess of supply over economic demand is followed by a big drop in prices, as occurred in the late 1920's. On the other hand, a relatively-small excess in economic demand over supply is followed by a big increase in prices."

The market for foodstuffs depends largely on the purchasing power of those engaged in industries other than food production. In brief, a long-term food and agriculture policy must reconcile the interests of consumers and producers and those of agriculture and trade.

For those reasons it was realised that by itself FAO could make only a limited contribution toward freedom from want and the achievement of an expanding world economy. It was proposed from the beginning to work closely with other agencies of the United Nations, particularly the Economic and Social Council, the International Monetary Fund and the International Bank, the World Health Organization, and the International Labour Organization.

International commodity organisations were a feature of the inter-war period. Agreements were concluded for sugar, rubber, tea, and certain minerals. Most of these were quota agreements—"children of the depression"—and were restrictive in character. During and since the war there have been further commodity agreements, such as the Inter-American Coffee Agreement and the Joint Organization of the Governments of the United Kingdom, Australia, South Africa, and New Zealand to dispose of wool surpluses. These organisations suffer from two major defects—the consideration of each commodity in isolation and the lack of financial resources.

Consideration of these factors prompted Sir John Boyd Orr to issue his proposals for the constitution of a World Food Board ultimately representing all countries, and probably appointed by the conference of FAO and including representatives from other interested international organisations. The functions of the World Food Board would be:—

1. To stabilise prices of agricultural commodities on the world markets, including provision of the necessary funds for stabilising operations.
2. To establish a world food reserve adequate for any emergency that might arise through failure of crops in any part of the world.
3. To provide funds for financing the disposal of surplus agricultural products on special terms to countries where the need for them is most urgent.
4. To co-operate with organisations concerned with international credits for industrial and agricultural development, and with trade and commodity policy, in order that their common ends might be achieved more quickly and effectively.

It was proposed that the board maintain very close collaboration with the proposed International Trade Organization.

Preparatory Commission

At the second session of conference of FAO held in Copenhagen in September, 1946, Sir John Boyd Orr submitted his proposals. The 47 nations represented there accepted the general objectives, restating them as follows:—

1. Developing and organising production, distribution, and utilisation of the basic foods to provide diets on a health standard for the peoples of all countries.
2. Stabilising agricultural prices at levels fair to producers and consumers alike.

To investigate the proposals the conference set up a preparatory commission of 16 member countries of FAO under the chairmanship of Viscount Bruce. This commission began sitting in Washington on October 28, 1946, and issued its report in January, 1947. The report is a comprehensive document of some 90 pages, including studies of a number of the major commodities which entered into international trade.

THE WORK OF FAO . . .

Briefly, the commission recommended the establishment, not of a World Food Board, but of a World Food Council of 18 members generally to negotiate the production and distribution of world supplies of food and raw materials. The commission was convinced of the necessity of preventing, as far as possible, that disturbing instability of prices which characterised the period between the wars. To achieve that it was considered that the most satisfactory method would be by inter-governmental commodity arrangements and agreements supervised and administered by the World Food Council. It was also proposed that these agreements provide for the creation of famine reserves of basic foodstuffs, held nationally for use internationally, and the establishment of limited price-stabilisation reserves or buffer stocks for commodities subject to seasonal and cyclical fluctuations. Among other recommendations was one for the sale of agricultural surpluses at special prices to countries in need but lacking the foreign exchange to buy their full requirements.

The International Trade Organization

Feeling that barriers to trade were a major cause of war, both directly in that they caused antagonism and irritation between nations and indirectly in that by reducing the free flow of trade they diminished the real wealth of the world, members of the United Nations considered, shortly after the establishment of that organisation, that some concrete action should be taken to facilitate the exchange and consumption of goods.

At its first session, held in London in February, 1946, the Economic and Social Council adopted a resolution constituting the preparatory committee of the International Conference on Trade and Employment. This committee met first in London in October, 1946, and again in Geneva the following April. There followed a prolonged session during which a charter was drawn up and detailed tariff negotiations were conducted between various countries. A considerable measure of agreement was reached on tariff reductions and some substantial adjustments were made. After a brief period the committee met again in Havana in November, 1947, negotiations continuing until March, 1948. As a result of these conferences a charter on trade and employment has been completed for submission to member Governments.

The report of the first session of the ITO Preparatory Committee contained a chapter on inter-governmental commodity arrangements in which the general procedure envisaged was: 1, The calling of a study group; 2, the convening of an International Commodity Conference; and 3, the formation of a governing body to administer the arrangement agreed on.

It was agreed that competent specialised agencies such as FAO should be entitled to submit commodity studies to the organisation or to ask that a study of a primary commodity be made. This was embodied in the final draft charter, which was published in September, 1947.

In the meantime FAO had conducted its third session of conference, also in Geneva, from August 25 to September 11. The report of the Preparatory Commission on World Food Proposals formed the basis of much of the discussion, especially by Commission I, dealing with "The World Food and Agricultural Situation." The conference agreed substantially with the preparatory commission's report, and Commission I recommended the establishment, not of a World Food Board with financial resources and wide powers to fix a general policy incumbent on member States, but a council within FAO to ensure co-ordination of action between Governments with a view to the implementation of FAO's policy while allowing member countries to retain maximum freedom of action.

There is little doubt that the conference was considerably influenced by the ITO commodity proposals as, though the ITO Charter had not yet been published, its contents were known to most FAO delegates, some of whom had been attending ITO meetings before the FAO conference. Commission I concluded its report with this sentence: "When ITO is established there will obviously be need for close co-operation between it and FAO; this could be provided for to some extent at least in an inter-agency arrangement."

The FAO conference amended its constitution to permit

of the establishment of its new council. This was done and the council established on the last day of the conference.

The Council of FAO

The Council of FAO, which superseded the previous executive committee, is composed of 18 member nations elected by ballot for a 3-year term, though to begin with one-third will have to be elected for each of the next 3 years, the duration of the initial period being decided by lot. Each of the 18 member nations then nominates its representative on the council. Viscount Bruce was unanimously elected independent chairman for the first 12 months.

The council held its first meeting in November, 1947, and its second from May 5 to 17, 1948. The immediate problems facing the council are short-range ones of food and material shortages, and one of its first acts was the absorption of the International Emergency Food Council, which now becomes a committee of the Council of FAO, and which is continuing to operate through commodity committees for those commodities still in short supply and under allocation.

At its first session the council formed a committee known as the Policy Committee on Production and Distribution, which, working with the staff of FAO, will secure all possible information on the individual production plans of member nations. At its second meeting in April, 1948, the council again reaffirmed the extremely-serious nature of the food shortage and urged on all member Governments the necessity for making every effort to increase production. Resolutions passed at the first meeting were concerned with maximum utilisation of available foodstuffs, especially dried milk and cereals.

To date FAO's accomplishments have been most marked in the technical sphere. It must be realised, of course, that the organisation is essentially one dealing with long-range problems, and no spectacular results are likely to be achieved for many years.

In the technical field much valuable work has been accomplished in the spheres of agriculture, nutrition, forestry, and fisheries, and the dissemination of technical information is a task of sufficient value and importance to justify the relatively-small expenditure of 5,000,000 dollars annually.

New Zealand and FAO

Membership of the United Nations and its specialised agencies does not necessarily mean the direct procurement of social or economic advantages. The main objective is co-operation among nations for the common good, and some members should be able to contribute more than others. In the field of food and agriculture New Zealand has much to offer.

In the first instance we can contribute to the knowledge of the world, and can assist in the provision of technical advice to less-favoured members. Our farm productivity per unit of labour is the highest in the world, and that is not entirely the result of a favourable climate. If the experience and knowledge available in New Zealand could be utilised in the establishment and management of pastures throughout the suitable areas of the world, we should indeed contribute nobly to the production of meat, wool, and dairy products. Our standard of living is high, and from a nutritional viewpoint we rank among the first nations of the world. Therefore, FAO cannot help us greatly in this connection.

At the moment, and for some time to come, we are producing food which is in short supply. Long-term contracts and high price levels safeguard our overseas income and allow of full employment internally. An increasing population, however, demands a real volume increase in overseas exchange as a basis for an over-all expansion in our national economy.

Our expansion and our future prosperity, in common with the future prosperity of others, depend on the successful functioning of the United Nations and its agencies. New Zealand is particularly vulnerable in view of our dependence on a narrow range of exports and limited markets, and it may well be that in the days ahead FAO and its activities in the field of distribution may be fundamental to our continued stability and prosperity.

CONSERVING SHEARING MACHINE GUT CORES

BECAUSE of the world shortage of materials, manufacturers of sheep-shearing machinery have had difficulty in meeting the demand for some essential parts, particularly combs, cutters, some handpiece parts, and long and short gut cores. The importance of practising economy in the use of available supplies is stressed in this article by G. L. Wickenden, Sheep and Wool Instructor, Department of Agriculture, Wellington, who illustrates how a little care and attention to the gut core will not only save the farmer money, but will help in conserving supplies.

NEW gut cores are supplied stiff and coiled (Fig. 1). Before the tube is assembled over the long gut core the bayonet joint of the core should be attached to the friction spindle catch (Fig. 2). The core is then greased lightly and softened by twisting it with the hand to take out all the stiffness and curves from the bayonet joint to the gut hook. When the core has been straightened out and thoroughly softened by having the grease rubbed in it should be given a final light coating of grease. Stiff and unsoftened cores cause slight whip in the tube and will eventually break, usually near the top.

End Play Allowance

Broken gut cores in the long tube are usually caused by failure to allow $\frac{1}{2}$ to $\frac{3}{4}$ in. end play in the long gut core when it is assembled inside the tube. After assembly of the tube joint and cores on the bracket (Fig. 3) the top wing nut A on the tube top sleeve should be slackened to allow the long tube to drop as far as it will go (Fig. 3, left). The tube should then be raised $\frac{1}{2}$ to $\frac{3}{4}$ in., and the top wing nut finally tightened (Fig. 3, right). All gut cores benefit from light greasing every two or three days while in use.

Where the latest type of adjustable steel tube is in use it must first be ensured that the bottom of the tube spring is hard down in the tube at C (Fig. 3) and that only the top seven

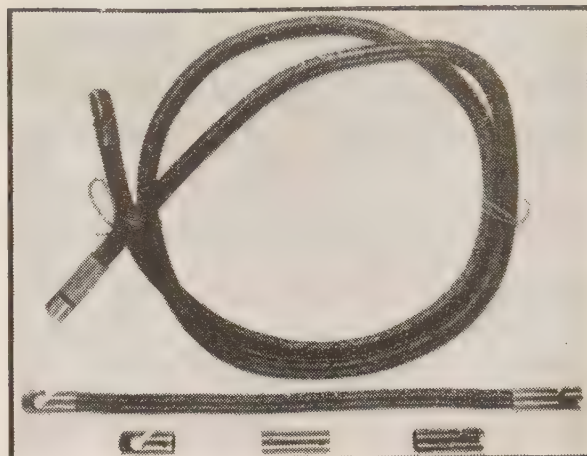


Fig. 1—A long gut core and a short gut core with fittings (from left): Gut hook, splicing ferrule, and bayonet joint.



Fig. 5.

coils of spring are inside the top sleeve at B. If there is too much of the spring in the top sleeve, the spring may vibrate, and if it touches the gut core, it will soon cut a groove in the core and cause it to fray and break. The top wing nut should be slackened at A and the long tube lowered as far as it will go. The long tube should then be raised $\frac{3}{4}$ in. before the top wing nut is finally tightened at A.

Repairing Cores

When repairing a broken long gut core it is important to make sure that the repaired core is the same length as a new one (Fig. 4), which will probably necessitate splicing in not less than an additional 2 in. of core. It is most important to cut the broken and unravelled or burnt end of the old gut core back to the solid (Fig. 5). When necessary this solid end of the gut core may be slightly tapered on the emery disc and a core-splicing ferrule fitted and screwed on. Nails of the right diameter may be used as rivets, and, with care, can be hammered straight through the holes in the splicing ferrule without first punching or drilling holes in the gut. The riveting pin or nail should be cut off almost flush on both sides of the ferrule before riveting, which should be done with a light hammer to avoid distortion of the ferrule. If rivet pins are too long, they will bend inside the core and may break out of the end. Ends of rivets should be cleaned off with a fine file and emery cloth, as rough ends cause friction in the tube.

Prevention of Damage

Damage may be caused to long and short gut cores by pushing oil-can spouts too far into the oil holes of tubes, thus cutting the revolving cores. Oil-cans for use with sheep-shearing machines are specially fitted with short, thick spouts to prevent damage when lubricating.

To prevent damage by rats spare gut cores can be hung inside lengths of piping.

Economy in the use of combs and cutters would result from more care in grinding; full information on correct methods is contained in the Department of Agriculture's Bulletin No. 234, "Shearing Machines."

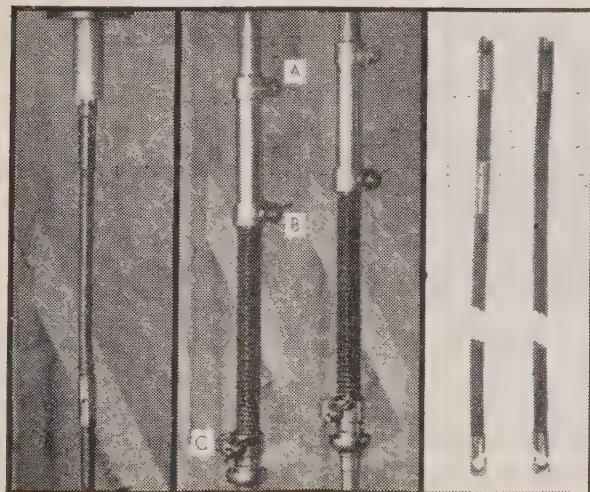


Fig. 2.

Fig. 3.

Fig. 4.

PEAT LANDS NEED COPPER FERTILISERS

Bluestone Topdressing at 5lb. per Acre Gives Healthier Stock and Increased Production

By I. J. CUNNINGHAM, Superintendent, Department of Agriculture Animal Research Station, Wallaceville.

PRACTICALLY all reclaimed peat land in New Zealand is deficient in copper. Shortage of copper causes disease in stock and reduced production, and it lowers the cash returns from the farm. When copper is supplied stock are healthier, production is increased, and net returns are greatly improved. The best way to supply copper is to topdress the whole farm each year with 5lb. of bluestone per acre.

THERE is a total of some 400,000 acres of copper-deficient peat throughout New Zealand in areas of different size. Large blocks occur in the Hamilton district, on parts of the Hauraki Plains, around Pongakawa, and on the Rangitaiki Plains. Smaller areas occur in many parts of North Auckland, for example at Ruakaka and Mangawai, at Waitoa and Patetonga in the Waikato, at Reporoa and Strathmore in the Rotorua district, in the vicinity of Otorohanga, at Pakipaki and Pukehou in Hawke's Bay, at Ngaere near Eltham, at Opiki near Shannon, in the vicinity of Featherston, on the borders of Lake Ellesmere near Christchurch, and at Otautau and adjacent areas in Southland. Still smaller areas are found in indentations along the east coast of North Auckland and in many other parts of both islands of New Zealand.

In all these areas there is evidence that the peat land and the pasture which grows upon it are deficient in copper and unhealthy for stock.

Effect on Stock

Deficiency of copper will cause disease in cattle, sheep, and sometimes pigs, but horses are less susceptible. Disease symptoms do not develop immediately in adult stock transferred from healthy country. Such animals have a body store of copper that will keep them going for about a year and which is sufficient to provide for progeny of the first year. It is in the adult stock that have been kept longer on deficient country and in the progeny from such stock that disease occurs.

Cattle of any age can be affected. Calves do not do well and unthriftiness may be marked from 6 months of age upward. Bones are weakened and easily broken and growth is poor. Those that survive to yearling stage scour persistently and lose condition still further when they eat the flush growth of pasture that comes with the spring. In areas where the deficiency of copper is severe very few, if any, calves can be reared. In areas where the deficiency is not so severe the calf mortality is lower, but the animals reach much less than the desirable weight and size as yearlings and two-year-olds.

In older dairy cattle deaths are less frequent than among calves. However, each spring, when the flush growth of grass comes along, and also when the autumn grass again flushes after the summer dryness, the cattle will scour profusely and persistently. They lose condition, more particularly in the spring; they become tucked up and miserable and their production of milk and butterfat is considerably reduced.

Beef cattle also scour and lose condition in spring and autumn, though the effects on them are less marked than

on milking cattle. On parts of the Hauraki Plains copper deficiency is so severe that beef cows grazed there are unable to produce normal living calves.

Both dairy and beef cattle will recover condition somewhat when the flush periods of pasture growth are over.

Sheep are affected only when young. Adult animals do well, though there may be a slight reduction in wool crop. Lambs, on the other hand, can be most seriously affected. At any time between birth and 3 to 4 months of age they may suffer a type of paralysis, usually of the hind legs. In consequence the lambs cannot move about to get food and will die. The longer the ewes are kept on copper-deficient country the greater is the percentage of lambs affected. In the lamb crop of the second year after ewes go on to deficient grass a number of the lambs have fragile bones which fracture easily and only a small number develop paralysis. In later years broken bones are less evident and a much greater percentage of lambs develop paralysis; up to 75 per cent of the lamb crop may be afflicted and die before weaning.

Disease in pigs is not seen very often. When it occurs the symptoms are of paralysis similar to that which occurs in lambs.

Prevention of Diseases

If copper is provided for stock, all these unpleasant symptoms are prevented. Many ways of supplying copper have been tried experimentally; for example drenching, spraying bluestone solutions on to hay, putting bluestone in drinking water, using licks containing bluestone, and topdressing the pasture with bluestone. The last method is unquestionably the best. Five pounds of bluestone per acre is a satisfactory topdressing provided the whole farm is topdressed each year. The method of applying the bluestone does not matter; it can be spread by hand, alone or mixed with sand, or mixed with lime or any other fertiliser and spread with a topdresser. Time of application is of some importance, as autumn topdressings have a more lasting effect on the copper content of the pasture.

If copper is supplied, the diseases mentioned above are prevented and, equally important, returns from the farm are increased. On one dairy farm, for instance, an expenditure of £13 on bluestone for topdressing returned approximately £300 in increased cream cheque; on sheep farms the increased returns from lambs will be sufficiently obvious.

Improved returns will be maintained only if topdressing is conscientiously carried out each year. The effects of copper deficiency are insidious, and if topdressing is not kept up, a drop in production on dairy farms will take place before gross signs of disease occur as a reminder of the omission. The programme therefore calls for regular annual topdressing with bluestone. This occasions no difficulty where superphosphate is used, as there is now on the market a copperised superphosphate containing 56lb. of bluestone per ton; 2cwt. of this contains a suitable quantity of copper for an acre.

Signs of Copper-deficient Soils

If the soil of a farm is peat, it should be suspected of being deficient in copper.

On dairy farms the following should be looked for:—

1. Bone weakness, poor growth, and high losses of calves.
 2. Severe scouring with loss of condition in yearlings and older cattle during spring and autumn pasture flush.
 3. Low production and unthriftiness in the herd.
- On sheep farms bone weakness or paralysis in lambs up to about 4 months of age should be looked for.

These can be prevented by topdressing with bluestone.

If more information is desired, it can be obtained from Bulletin No. 233, "Copper Deficiency in Cattle and Sheep," issued free at any office of the Department of Agriculture.

Farmers who suspect copper deficiency on their properties should consult their local Government veterinary officer or club veterinary surgeon.

THE HOME GARDEN IN NOVEMBER

By A. G. KENNELLY, Instructor in Vegetable Culture,
Department of Agriculture, Christchurch.

THERE is plenty of work to be done in most home gardens in November. The ground should be kept cultivated, weeds removed between growing crops, and thinning done where necessary. Seed of winter greens such as savoy cabbage, broccoli (winter cauliflower), and curly kale can still be sown. In most southern districts a first sowing of swedes can be made and where conditions are not too hot and dry peas can be sown.

SUCCESSIONAL sowings of spinach and salad crops such as lettuce, radish, spring onions, and turnips, and the planting out of cabbage, cauliflower, and lettuce to mature in late summer and autumn should be attended to during November. Support should be provided where necessary for such crops as tomatoes and climbing beans. (Different methods of supporting these crops were described in last month's "Journal.") Beds can be prepared for an early planting of celery, and earlier-planted potatoes can be earthed up and the planting of the main crop completed. Asparagus should not be cut for too long each season, as this may weaken the crowns; about 6 to 8 weeks is usually long enough.

The sowing or planting of frost-tender subjects such as french or runner beans, cucumber, marrow, pumpkin and squash, tomatoes, and sweet corn can be proceeded with except in Canterbury and districts to the south, where, apart from a few favoured areas, there is danger of frost until the second week in the month, and young plants should not be continuously exposed until after about the tenth to the fourteenth days of the month.

Chicory (*Cichorium intybus*)

Before deciding to grow chicory it is important to differentiate between the kinds. Chicory of the Brunswick or Magdeburg type should be grown only for its roots, which when properly prepared provide the chicory commonly used in coffee. For salad use the French, Whitloof (White Leaf), or Brussels chicory should be chosen, though the common variety (Barbe De Capucin or Monk's Beard), which forms a loose head of leaves that have to be tied together, can be grown. Seed should be sown in November



[Sparrow Industrial Pictures Ltd. photo.]
Potatoes should be well earthed up in the rows to promote good tuber development and to give protection against the potato tuber moth.

or December in rows 1ft. apart and the plants thinned to 8in. apart. The roots can be lifted carefully from May to August (a few at a time as required) and planted in deep boxes of moist soil. The crowns can then be covered with from 9 to 12in. of soil and the boxes kept in a shed or cellar from which all light and frost are excluded.

The chicory, which after 3 or 4 weeks develops a compact bud rather like a small cos lettuce, will be of poor quality if conditions are too warm. After the top growth has been cut the roots can be taken up and thrown away. Quite good chicory can be obtained by covering the roots in the open with a layer of soil or sand held by two planks placed on edge about 1ft. apart. Chicory has a flavour somewhat like that of celery. The shoots or buds are succulent and are a valuable addition to most salads.

Choko (*Sechium Edule*)

Except for the fruit, the choko (chayote or Mexican marrow) is rather like a very vigorous climbing cucumber. It is a frost tender perennial and subject to leaf-scorch from cold winds. It has separate male and female flowers and after fertilisation the fruits grow very quickly; in suitable warm, sheltered situations the plant produces continuously until cut down by frost. The fruit varies in size from 2 or 3oz. to 1lb. or more and is usually cooked like pumpkin or marrow. Because of its vigorous growth one established plant will produce sufficient fruit for the home garden. A plant will continue to bear for years if the situation is suitable, though it may take 2 years to become established. To obtain a new vine the whole fruit is planted. The fruit can, if desired, be placed in a warm situation first to shoot like a potato. Chokos occupy too much ground if grown like pumpkins and should be planted where they can ramble over a low trellis, hedge, or similar support. There are two varieties, a white or cream and a green fruited.

Collard or Colewort

Collard or colewort (*Brassica oleracea* var. *acephala*) is generally classed as a non-heading cabbage, but is actually a kale. Though occasionally listed in seedsmen's catalogues, collards are not grown much in New Zealand. They are useful for winter or spring greens in the colder districts, as they are quick maturing and can be inter-planted with cabbages (especially spring cabbage) and can be cut for greens before the cabbages require the space. There is little to be gained by planting them in districts where cabbage grows well throughout winter and where spring cabbage follows the savoy or winter cabbage without break in continuity.

Culture is similar to that of the cabbage, though they will succeed in a poor soil. Most varieties are small, compact



[Green and Hahn Ltd. photo.]
Because of the relatively-short season of harvesting of peas, continuity of supply can be ensured by having sowings mature in succession. This may be done either by sowing at about the same time several varieties having different maturity periods or by making regular fortnightly or three-weekly sowings of similar varieties.

THE HOME GARDEN IN NOVEMBER . . .

in growth, and can be set out about 12in each way, though large varieties that are to be left should be spaced 2 to 3ft. apart. Collards can be used in about 2 months from sowing, though they stand well and can be harvested over a considerable period. Harvesting can be done by stripping the leaves in the same way as kale or by cutting the rosette or the rosette and stalk together. Their food value is very high and they are one of the richest sources of vitamins. Hardy Green is an old and very accommodating variety, though Rosette is of better quality and develops a small, close head.

Egg Plant or Aubergine

The egg plant (*Solanum melongena*) is also known as the guinea squash and can be grown successfully in the open only in specially-favoured districts. It is a long-season, tender crop and should, like the tomato, be started under glass about 6 weeks before being planted in the open. About half a dozen plants should be sufficient for the average family. A small quantity of fruit is grown commercially in the warmer parts of the North Island. Though it is desirable to have the plants well developed when set out, because they need a long frost-

free season, they require care in transplanting and usually suffer least check if set out when about 3 to 4in. high.

Egg plants grow well on a wide range of warm, fertile, well-drained soils. An abundance of plant nutrients and organic material is desirable, as the plant is a heavy feeder and responds to liberal manuring. Though individual plants in nearly ideal situations are capable of yielding 8 to 12 fruits, in New Zealand it is usually advisable to pinch out the growing points when plants are about 6in. high and limit the fruit to 3 or 4 a plant. Unfavourable soil or weather conditions will affect the setting of the fruit. Fruit can be used at any stage up to full size, but it tends to become pulpy when over-mature and is usually gathered when fully coloured like tomatoes. The time required from sowing to harvesting is greatly influenced by warmth and in New Zealand is rarely less than about 5 months. Plants should be set out 24in. apart in rows 30 to 36in. apart. Good varieties are Black Beauty, New York Improved, and New Hampshire Hybrid.

Lamb's Lettuce or Corn Salad

Lamb's lettuce or corn salad (*Valerianella olitoria* and *V. eriocarpa*)

is a fairly good substitute for lettuce in winter, as it matures quickly and is easily grown. It grows particularly well on well-drained soil that was dressed with organic manure for the previous crop. Several sowings should be made in shallow drills 6in. apart from February to April and the plants thinned to 6in. apart in the rows. The leaves may be plucked or the whole plant used similarly to spinach.

Melon (*Cucumis melo*)

Warm, rich, well-drained loams or sandy soils rich in well-rotted organic matter are best for melons. The plants are tender and seed does not germinate well if soil and weather are cold and wet. Melons rarely produce good crops in southern districts unless grown under glass. Cultivation under glass and in the open is very similar to that of cucumbers, except that under glass less bottom heat is required and in the open more space should be given (particularly to water-melons).

Melons can be divided into the following three groups:—

1. **Varieties generally known as rock, cantaloup, or musk melon.** Examples are Hales Best, Cantaloupe Yellow, Honey Rock, Honey Dew, and Casaba.

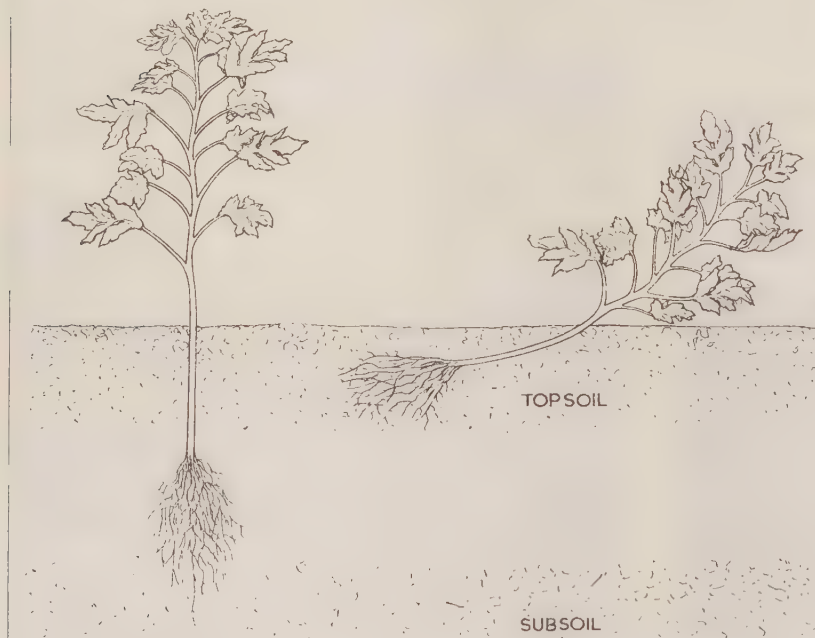
When grown under glass it is usual to pinch out the tip of the main shoot of the musk melon type when it reaches the top of its support, as the fruit (which must be supported) is mainly borne on laterals which are usually stopped about one leaf beyond the fruit, only about six of which are allowed to develop on each plant. In frames or outdoors in warm areas two laterals can be developed. Ripeness can be detected in smooth-skinned varieties by the change of colour, but is more easily detected in netted varieties by the parting of the stem or pedicel from the fruit. Ripeness should be watched for closely, as sugar content increases until full maturity. Some varieties are not ready for the table until a day or two after the pedicel is fully severed. There is little or no gain in sugar when immature fruit is picked and stored. High quality in melons can be obtained only if there is sufficient healthy foliage and temperatures are warm and conditions sunny. Plants can be spaced two to a "hill" with the hills 3ft. apart in rows 5ft. apart. More liberal spacing is desirable in very warm, sheltered areas where growth is more vigorous.

2. **Watermelon (*Cucumis* sp. syn. *Citrullus vulgaris*).** Popular varieties are Honey Cream, Klondyke, Ice Cream, and Kleckley.

Like the musk melon, the watermelon requires a long warm season, but differs in that it is more resistant to dry conditions and tolerates a rather acid soil. Hills in warm districts should be 3ft. apart in rows 6ft. apart. The plant does well on virgin and rich, sandy loams, though in most home gardens where it can be grown outdoors it should, like the other types of melon, be planted in soil on or beside a small amount of fermenting manure buried in the ground.

3. **Preserving melons.** Popular varieties are Citron, Pie Green Seeded, Frosted, and Long Green (which is excellent for jam).

PLANTING TOMATOES



Unless tomatoes are very short and sturdy, they should be planted in the field a little deeper than they were in the seed boxes. This encourages the development of adventitious roots on the stems, which greatly assist growth and are particularly important where plants have suffered root injury from handling or disease or have become drawn up through being left too long in the boxes. The difficulty of encouraging the development of stem roots without placing the ordinary roots in the deep, cold, less-aerated, near-subsoil levels can be overcome by planting as shown on the right.

Preserving melons are varieties of watermelon, but the flesh remains firm. They are used either for pies or for jam. Culture is the same as that of watermelons.

Mustard Greens (*Brassica juncea*)

Alternative names for mustard greens are Chinese mustard and mustard spinach. Apart from the variety *Sinapis alba*, the culture of which, together with that of cress, was described in the August "Journal," there are several kinds of mustard. The mustard greens are hardy, useful, and easily-grown forms of greens that deserve to be more widely grown in home gardens.

Contrary to general belief they are not new to the vegetable garden, though the improved strains now available and the modern appreciation of vegetables that are rich in vitamins have made people more aware of them. There are several kinds, the loose-leaved sorts being represented by the broad-leaved varieties such as Florida Broad-leaved and New Chinese, and the curled types by varieties such as Southern Giant Curled. The newer variety, Tendergreen, which is also known as mustard spinach, is particularly fine. It has dark-green, rather thick, fairly-smooth, spoon-shaped leaves and combines the flavours of mustard and spinach. As it is slow to seed, its sowing in the hotter, drier districts need not be confined to the spring and autumn, as is advisable with some of the other varieties. A hearting variety (Hearting Chinese Mustard) is also sold by some seedsmen. The leaves grow 12 to 14in. long and the hearts, which are about 8in. broad, blanch well.

The flavour of all the varieties mentioned is mild, and though some varieties will grow fairly well in the poorer soils, for best results it is advisable to grow them in rich, moist soils and in moderately-cool conditions. The open varieties, in particular, are an excellent substitute for spinach and should be gathered the same way, though the leaves are larger than the largest spinach leaves. Thinnings should be pulled first and used with the roots cut off, and later when the remaining plants are large enough a few of the largest leaves can be taken off as they develop. They can be removed with the fingers or a pair of scissors and should be used when young and tender; they can be either cooked like spinach or used in salads. Mustard greens are an excellent source of vitamins; they are very rich in vitamins A, B₂, and C, and a good source of vitamin B. Seed should be sown ½in. deep in rows 15in. apart and the open-leaved kind thinned 6in. apart in the rows and the hearting kind at least 9in. apart. The crop should be ready for use in from 35 to 45 days from seeding.

New Zealand Spinach

The New Zealand spinach (*Tetragonia expansa*) is a half-hardy, trailing annual with large, succulent leaves. It is not a true spinach, but is invaluable for use in hot, dry, sunny situations, and is often preferred because it lacks the peculiar bitterness of true

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[Green and Hahn Ltd. photo.]

The secret of producing crisp, tender heads of lettuce is quick growth; if growth is slow, the plant will be tough and have a bitter taste. Successional plantings will ensure continuity of supply.

spinach. Growth is rapid and it responds best to a light, fertile soil in a sunny position with adequate moisture. It is harvested by pinching off about 3in. of the growing tips, which forces new shoots to develop, so that when established the plant has a multitude of tips for gathering. It grows quite large and should be given a spacing of at least 2ft. each way. Seed is usually rather slow to germinate and should be sown 1 to 1½in. deep not more than a week before frost danger is past. Two or three seeds should be sown together at each spacing and the weaker ones removed after establishment.

Okra or Gumbo

Okra or gumbo (*Hibiscus esculentus*) is also known as lady's fingers. It requires warm conditions for germination and growth and succeeds only in favourable situations. Though it is possible to mature the plants in 3 to 4 months, uninterrupted hot conditions are required and it is difficult to secure good crops except in districts which have a long, hot growing season with warm nights. It is very susceptible to frost and can be started, like the tomato, under glass and set out when frost danger is past, or where conditions are very favourable two or three seeds can be sown ½in. deep in groups 18 to 24in. apart in rows 30 to 36in. apart. Only the strongest plant at each spacing should be left when it is about 4in. high.

The soil should be warm, fertile, and well drained and the best results are usually obtained from sandy or light loams that are well supplied with organic material and to which, if they are low in plant foods, a complete fertiliser has been applied. Pods are horn shaped and vary in length from

about 4 to 8in. They are used when green, as the pods (except those of the newer, improved, spineless-podded strains) become fibrous and inedible as they approach maturity. Young pods are mucilaginous and are used in soups and stews and with other vegetables. There are tall, dwarf, and lady's finger types. Staking is not necessary in the sheltered situations in which they should be grown.

Recommended varieties: White Velvet (Lady Finger), Dwarf Green Early, Clemson Spineless (long podded), and White Lightning.

Pepper or Capsicum (*Capsicum* spp.)

In New Zealand peppers are grown as annuals, but there are annual and perennial varieties. Some peppers or capsicums are also known as chillies (the Spanish word for any kind of pepper). There are two general classes—the mild, used for salads and pickles, or baked or used as a vegetable, and the hot, used for relishes, seasoning, pickles, and sauces. The small pungent or chilli varieties are the source of cayenne or red pepper, which is quite distinct from the commercial black and white peppers, which are derived from the fruit of *Piper nigrum*, a tropical woody plant.

The pepper requires a warm situation and succeeds in southern districts only when grown under glass. Even in warm northern districts which experience a long frost-free season it is best set out in a warm, sheltered part of the garden. Plants should be raised under glass like tomato plants and set out toward the end of October. Peppers require care in transplanting and should be planted 12 to 24in. apart (according to habit of growth) in

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rows 2 to 3ft. apart. In warm localities fruits commence to mature about March and continue until cut down by frost. Staking is unnecessary.

The soil should be warm, well drained, moist, and rich in organic material, but should not be too rich in nitrogen, as an excess may over-stimulate leaf growth to the detriment of the fruit. Light soils are usually favoured, as they warm readily. In the setting of the fruit peppers are sensitive to soil and weather conditions.

There are many varieties with different shapes and colours ranging from dark red to orange-red, yellow, and green. The most popular are those of the bell group, which are large-podded, sweet peppers used either in the green or in the mature stage mainly for stuffing. Other important groups are the tabasco or chilli, cayenne, cherry, and pimento.

Popular mild, sweet varieties: Californian Wonder and Golden Queen.
Hot: Long Red Cayenne and Tabasco.

Pumpkin, Squash, Marrow

The names pumpkin, squash, and marrow are the popular terms for several species and a large number of varieties of cucurbits, including some members of the gourd family. They cross readily, and there is a good deal of confusion in their nomenclature. Most squashes and some pumpkins are classed as varieties of *Cucurbita maxima*, but the number of varieties is very great and certain of those generally known as squashes

are varieties of *Cucurbita moschata*. Varieties of vegetable marrow (*Cucurbita pepo*) are sometimes called summer squashes.

Culture and soil requirements, however, are the same for all. They should not be sown in the open to be above ground before frost danger is past and the ground must have warmed sufficiently and not be too wet, or the seed is liable to rot. They thrive in a wide range of soils, from sandy to moderately heavy, provided there is an assured supply of moisture (preferably held in suspension in the soil) and plenty of organic matter.

Well-drained, light, warm, aerated soils are best for early crops, but for main crops heavier soils usually give a higher yield over a longer period. Organic matter can be increased by digging in a green crop, but better results are obtained if 1 cub. ft. of soil is removed at 2 to 3ft. intervals and the holes, except for the top 3 or 4in., filled with manure (preferably with partly-rotted, fermenting stable manure). Seed can be sown in soil placed on top, or preferably at the edge, of the manure. Rows should be at least 4ft. apart; this is known as the hill system of sowing. The ground should preferably be level after sowing to facilitate watering if it is necessary.

Where early harvesting is desired or in districts which experience a relatively-short frost-free growing season it is advisable to start the plants on a hotbed or in pots or boxes under glass. Pots or paper containers are preferable, as the plants are particularly sensitive to root injury. When

sowing in the field or under glass it is usually best to sow two or three seeds in groups and when they are established to leave only the strongest. Seed should not be sown under cover too early (about 3 to 4 weeks is usually suitable), as handling is difficult if the plants begin to vine, and if they are root bound, they may be checked. The temperature for raising seedlings should be between 60 and 75 degrees F.

Apart from watering and weed control, very little attention should be necessary after the plants are established. With trailing varieties it may be necessary to pinch out the ends of each leader when they are about 18in. long to encourage the development of laterals. Plants can be trained by pegging the runners with sticks. The fruit of marrows should be cut when young, preferably before the skin hardens so that it cannot be broken easily by the thumbnail. Ten to 12in. is a good size. The bigger marrows become the less flavour they have, and the greater becomes the relative area devoted to seed. In favourable seasons, too, the more fruit is cut the more will develop, and it is therefore inadvisable to allow fruit to reach full maturity unless it is intended to grow mammoth specimens or store fruit for the winter.

Marrows store well and, like pumpkin and squash, should be allowed to mature fully if they are to be stored and should be harvested carefully without being subjected to even slight frosts. They should be stored under perfectly-dry, frost-free conditions. There are bush (compact-growing) and vining or trailing varieties of marrow, pumpkin, and squash. The bush varieties are more suited to the home garden unless there is ample space available, but the culture of this type of plant is mainly confined to vegetable marrows, because most popular types of pumpkin and squash are trailing in habit.

Varieties.—**Squash:** Hubbard, Turban, and Warren. **Pumpkin:** Cheyenne Bush (very small), Triamble, and Beadesert (Queensland Blue). **Vegetable marrow, bush:** White and Green. **Vegetable marrow, trailing:** Long white, long green, and cream. **Scallop, Patty Pan, or Custard Marrows:** Early White and Bush Scallop, Green Tinted Bush Scallop, and Yellow Bush Scallop. **Italian vegetable marrow:** Zucchini and Cocozelle. Vegetable spaghetti (Manchurian squash) is an interesting novelty and a useful vegetable.

Rhubarb

Rhubarb responds to liberal manuring, but production from even the healthiest of well-fed crowns is liable to be affected if harvesting is continued too long on a heavy scale. Pulling the stalks is an exhausting process and the crown must be given an adequate period in which to develop the leaves with which it is enabled to build up stores of plant food. Most varieties are dormant for a time and the leaves must be enabled to do their work before dormancy occurs. Beds should not become dry, and if low in plant food, the ever-bearing varieties should now be watered with liquid manure.



[Green and Hahn Ltd. photo.]

Savoy cabbage (winter cabbage) is rich in vitamins and needs comparatively little attention. A light, easily-worked soil is preferable for the seed-bed and it should be enriched some time before sowing by the thorough incorporation of well-rotted organic manure.

Tampala

Tampala is a comparatively-recent introduction from America. It offers a pleasing change from other greens such as silver beet or spinach and has a distinctive flavour. It is easy to grow, and as it does well in hot weather and can be grown to produce throughout the summer, it makes an excellent substitute for spinach. There are two varieties, one with green leaves and the other green variegated with red. Sowing should be delayed until the ground is warm. Soil should be well drained and moderately rich in organic matter and seed can be sown thinly $\frac{1}{2}$ in. deep in rows 15 in. apart.

Turnip (*Brassica rapa*)

There is some confusion between certain varieties of turnips and of swede turnips. Swede turnips originated in Northern Europe and are of more recent introduction than ordinary turnips. In general their food value and keeping qualities are superior and most varieties withstand severe weather conditions better than turnips and growth is larger.

There is a considerable range of varieties of both turnips and swede turnips. The principal differences are that the leaves of the swede turnip are not hairy and often have deeper lobes, the roots are more pronged, and the crown or neck is prominent, whereas the turnip has little or no neck. To the home gardener the term swede generally means several varieties of swede turnip of a characteristic type, but it seems that it is more correctly synonymous with the rutabagas, which include a much greater range of types.

Provided there is sufficient moisture in the soil, turnips tolerate much greater heat than swede turnips, and as many varieties are quicker maturing, sowing can be spread over a longer period. In moisture-holding soils such as free loams rich in organic material and sandy or peat soils on high water-tables most varieties of turnip grown in the home garden will succeed even if sown in the heat of summer in the warmer districts, but on stiff clays or soils which dry out rapidly the crop is likely to fail in the hotter part of the year if rainfall is low.

Different varieties of turnips mature in good growing conditions in from 30 to 80 days. For good quality it is essential that they should be grown quickly without check. They belong to the brassica family and, like swede turnips, should therefore not follow cabbage, cauliflower, or other brassicas. They are fairly tolerant of acid conditions, but lime should be applied if the soil is acid, as the crop is liable to club root disease, and reduction of acidity is important in its control.

Seed can be sown in most districts as early in spring as soil conditions will allow; where conditions are not too dry successional sowings can be continued until February (or even later where a sufficiently-long mild autumn is experienced). For late sowings the quicker-maturing varieties should be chosen unless ordinary varieties are being grown for their tops, as the plants will not develop bulbs if checked by cold winter conditions.

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[Green and Hahn Ltd. photo.]

Curly kale (borecole) is very hardy, stands well, and is among the latest of the winter greens. Good varieties are tender and have a delicious flavour.

Good home garden varieties: Early White Milan (6 weeks), Milan Purple Top (6 to 8 weeks), and Golden Ball (Orange Jelly) (9 to 12 weeks). Golden Ball stands well and is especially suited to late summer or autumn sowing.

Turnips are occasionally grown in New Zealand for their tops, which are a rich source of vitamins. Usually the ordinary white varieties are chosen, but specially-selected sorts are: Seven Top (the roots of which are too tough for the table) and Southern Prize (the roots of which are fairly good when young).

Swede Turnip

In growing conditions that suit them swede turnips (*Brassica campestris napobrassica*) mature in from 55 to 90 days. Growth and yield are greatly influenced by climatic conditions. Varieties that require a long growing season thrive best in a cool, moist climate with neither dry periods nor very heavy rain. Sunshine is not important; in fact, because of the moister conditions longer-maturing varieties generally do best in late autumn, when sunshine is reduced. Good-quality swedes are a very useful addition to the home garden, particularly in the south, where cooler and moister conditions enhance their quality and flavour. Swedes are high yielding and, like turnips, do not require special soil, provided drainage is

good and there is adequate moisture. They respond well to a soil moderately rich in well-rotted and well-incorporated organic matter. A dressing of superphosphate at the rate of 1 to 2 oz. a square yard is advantageous on most soils.

In the home garden swedes are usually grown for late-autumn and winter use, and in southern districts a sowing can be made in November or December; further north December or January (or in very mild districts even February) is favoured. Suitable varieties can be sown earlier when there is sufficient moisture for growth, but as there is rarely much demand for them until late autumn and cool conditions are required for producing best-quality swedes, it is usually advisable to delay sowing, provided the roots are enabled to make most of their growth before winter.

Varieties: Laings Garden (medium), Superlative Table (tankard shaped), and Rutabaga Purple Top (large).

Winter Greens

Brussels sprouts, kale (borecole), savoy cabbage, and broccoli (heading and sprouting) deserve more attention than they receive in most home gardens. They are rich in vitamins, high yielding, and require comparatively-little attention. Seed should be sown $\frac{1}{4}$ to $\frac{1}{2}$ in. deep in a seed-bed that is well drained and cultivated to

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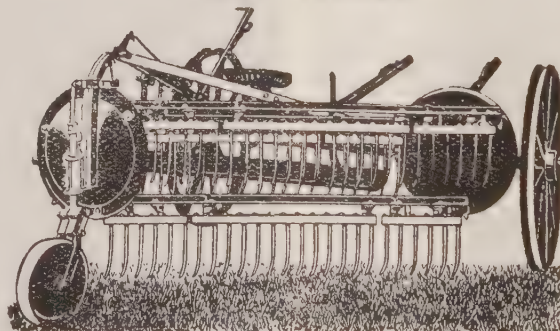
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a fine tilth. The soil should be enriched some time before sowing by the thorough incorporation of well-rotted organic manure. A light, easily-worked soil is preferred for the seed-bed, though fairly heavy loams that are well drained and suitably enriched are usually preferred for growing the crop. Only a proportion of home gardeners sow seed; many purchase plants, which are available from most seedsmen, for setting out in December or January. The roots should be "puddled" in muddy water to help keep them wet if there is a risk that they may become dry, and where conditions are hot and dry it is advisable to cut a third off the older leaves to reduce transpiration. If cabbage aphides, diamond-backed moth, and white butterfly are troublesome, the plants should be dipped in a solution of nicotine sulphate and arsenate of lead (½oz. of nicotine sulphate, ½oz. of arsenate of lead, and ½oz. of hydrated lime to 1 gallon of water). Where aphides are not troublesome the nicotine sulphate need not be used.

Brussels Sprouts

Brussels sprouts (*Brassica oleracea bullata gemmifera*) have a well-deserved popularity and are not difficult to grow. The main requirements are a deeply-cultivated, rich, firm soil, adequate moisture, good spacing, a long season of growth, and, where grey aphides are troublesome, regular and thorough spraying with nicotine sulphate.

It is important to purchase good strains. In New Zealand varieties are rarely classified, but overseas they are usually listed according to height and occasionally to maturity. Strains fall roughly into three groups: Dwarf (up to about 18in. high), medium (from about 18 to 24in.), and tall strains (over 25in.). Sprout sizes, too, are variable and have a classification. The Cambridge Horticultural Research Station has produced stocks known as Cambridge No. 1 (early), No. 3 (main crop), and No. 5 (late, tall), which are likely to find favour with both home and commercial gardeners. Good types of brussels sprouts should form sprouts early and uniformly and they should keep well without bursting. They should be set closely, but not so close that picking is difficult, and should be firm, large, round, and compact and of a healthy green colour; they should also be resistant to adverse weather and aphides (some stocks are more resistant to aphides than others).

Brussels sprouts succeed on a wide range of soils, but if grown on land too rich in nitrogenous material, they usually grow rankly and produce many loose, open, poor-quality sprouts.

Soil richly manured with organic material for a previous crop is best, and for the growth of the sprouts it can be dressed with artificial manure, as too much organic matter tends to make the soil spongy, and firmness is required for good sprouts. A complete fertiliser (nitrogen, phosphoric acid, and potash) gives the best results, though the dressing should be highest in phosphoric acid, which can be supplied in the form of superphosphate.

In home gardens where space permits and brussels sprouts are appreci-



Brussels sprouts should not be planted too closely, or some plants may become suppressed and others drawn up. [Green and Hahn Ltd. photo.]

ated several crops can be grown each year. A first sowing made under glass in August can be followed by one or more successional sowings, the last usually in November, provided that in southern districts there is a sufficient period for the plants to develop fully before winter.

Varieties: Scrymger's, Giant, Fillbasket, and Long Island Improved.

Broccoli

The common broccoli (*Brassica oleracea* var. *Botrytis asparagoides*) is for all practical purposes a hardy winter cauliflower and does not differ from the cauliflower usually grown for summer use except in hardiness and stronger development in most varieties of the leaves encircling the head. Varieties are available which mature in from about 5 to 12 months. Seed of varieties with different maturity periods can be sown in succession or at about the same time between the end of September until December, but October is the preferred time; in southern districts, in particular, delay beyond this is rarely advisable. If resowing is necessary because of seed failure and the season is dry, growth will be backward and it is important that sturdy plants are set out in sufficient time to enable them to develop properly before winter weather checks growth. Transplanting to the field is

usually done in December or January, but in districts having a long mild autumn or where conditions are moist and reasonably free from severe frosts late varieties can be set out in February.

Except for weed control and, where weather is boisterous, a certain amount of earthing-up of the stems to stabilise the plants, broccoli planted in rich, well-drained, and well-cultivated soil requires little attention. As the curd commences to develop, a leaf or two should be bent to give protection from frost. Modern strains of broccoli produced by reputable seed firms are on the whole very reliable and commence to "head in" according to their specified maturity periods, but a period of unseasonable weather, particularly if it is sunny or moist and warm, is always liable to alter the timetable. Varieties of broccoli are available that mature or "head in" from late autumn until November. Examples are: Michaelmas Early White, Veitches Self-protecting (early), Mammoth Winter White, Snow's Improved (winter), Lily White No. 2, St. Valentine (spring), and Late Queen (late spring).

Non-heading Varieties

There are three kinds of non-heading, sprouting, or Italian broccoli (*Brassica oleracea* var. *Italica*)—green,

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white, and purple. They produce a terminal main head on a fleshy, branching stalk. After the main head has been removed side heads or shoots continue to form on most varieties and may be picked for a considerable period. Varieties of sprouting broccoli vary in maturity from about 3½ to 12 months. The quick-maturing varieties are treated like cabbage and the slow-maturing ones usually like broccoli. Heights vary from 15 to about 36in.

Varieties: Italian Green Sprouting (Calabrese), Early Purple Sprouting, Late Purple Sprouting, and White Sprouting.

Broccoli Rab

Broccoli Rab (Italian turnip) is rarely cultivated in New Zealand. It is grown for the tops and tender flower shoots, which are used as greens, for which it is particularly useful in early spring. It grows about 18 to 22in. tall and in good growing conditions matures in about 10 weeks. It should be sown in early spring or autumn.

Kale or Borecole

There are several varieties of kale (*Brassica oleracea acephala*)—thousand-headed, asparagus, cottagers, Russian or Siberian, drumhead, and variegated—but Scotch kale or borecole is most commonly grown in home gardens. The kales are very accommodating and usually do well following early potatoes if the soil was well dressed with organic manure for the potatoes. Cultivation of most varieties is similar to that of brussels sprouts. They deserve to be more commonly grown in New Zealand gardens, because good strains are among the most delicious and health-giving of vegetables. It is important to obtain a

good strain of a suitable variety, as the growing of strong-flavoured, coarse-leaved kinds (particularly some thousand-headed and Hungry Gap strains) has been responsible for much prejudice against kale.

Kale is grown mainly as a winter vegetable and it is usual to make only one sowing late in October or in November. However, seed of American-developed strains (Siberian and certain strains of Scotch curled) can be sown later, as in favourable conditions they take only about 2 months to mature. Besides being used for boiling, some of these strains are valuable for salads if used young, and several sowings may be made from spring onward. The plants can be treated similarly to cabbage.

Of the older types of kale, asparagus kale, which has distinctive, long, thin shoots that resemble sprouting broccoli rather than asparagus and produces its edible branches in spring, is one of the best for the home garden, as it has an excellent flavour and stands through the winter, coming into bearing in spring, when most gardens are rather bare of greens. Fine-curved strains, cottagers, and Scotch kale of British origin are also useful in the home garden. Variegated kales are used for garnishing.

In general the common varieties fall into two groups: Dwarf (about 12 to 24in. high) and tall (about 30in. and higher). They should be set out 18 to 24in. apart (according to height) in rows 30in. apart.

Other Vegetables

Advice on culture of beans, beet, carrots, cucumbers, kumara, lettuce, onions, parsnips, peas, potatoes, spinach, sweet corn, and tomatoes was given in last month's "Journal."

Penicillin Preparations for Treatment of Mastitis

REGULATIONS to govern the sale of all penicillin preparations which have now been gazetted under the Food and Drugs Act are of special interest to dairy farmers, as they specify the conditions under which penicillin preparations for the treatment of mastitis may be sold.

The preparations may be retailed only by veterinarians or pharmaceutical chemists, and to procure them from a pharmaceutical chemist a veterinary prescription, which may be obtained from a club veterinarian, a private veterinary surgeon, a Government veterinary officer, or a registered veterinary practitioner, is necessary. The veterinarian is permitted to give the prescription only if he is satisfied that the farmer is sufficiently instructed in the proper use of the preparation.

In order to cause the least possible inconvenience to dairy farmers provision is made for the veterinary prescription to specify repeat orders. When obtaining prescriptions dairy farmers should therefore discuss with the veterinarian how many tubes they should purchase at a time and how often they should obtain this number during the season. It will then be necessary to obtain only one prescription for each dairying season.

In cases of emergency the veterinarian may give the prescription to the chemist by telephone.

Dairy farmers in some isolated districts where a veterinarian may not be readily available should consult the nearest Inspector of Stock, who, if the dairy farmer has attended a veterinary demonstration of the method of administering the preparation, will obtain a prescription from a Government veterinary officer.

METEOROLOGICAL RECORDS FOR SEPTEMBER

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Auckland	160	55.6	+ 1.1	67.2	43.0	3.45	17	- 0.53	0.69	28	188.1
Tauranga	10	53.4	+ 1.0	66.0	32.2	2.28	10	- 1.91	0.71	18	223.2
Ruakura	131	51.2	- 0.3	68.9	30.3	2.74	15	- 1.08	0.74	28	187.8
Rotorua	980	51.2	+ 1.7	66.0	32.0	3.80	12	- 1.09	2.18	18	
Gisborne	12	54.9	+ 2.8	75.2	37.0	0.71	8	- 1.87	0.46	1	196.0
New Plymouth ..	160	53.5	+ 2.0	67.7	36.2	3.71	16	- 1.27	1.04	18	168.2
Napier	6	54.5	+ 2.7	73.9	33.0	0.87	7	- 1.14	0.27	8	211.3
Taihape	2157	48.3	+ 2.5	62.2	33.7	2.33	15	- 0.83	0.54	9	
Wanganui	72	53.4	+ 1.9	71.1	36.0	2.05	13	- 0.82	0.55	29	180.2
Palmerston North ..	110	52.5	+ 2.2	67.2	32.4	1.89	17	- 1.19	0.80	28	142.2
Waingawa	350	50.8	+ 1.5	72.0	28.0	1.70	13	- 1.76	0.34	24	193.6
Wellington	415	51.9	+ 1.8	63.9	40.0	1.37	14	- 2.28	0.30	24	159.5
Nelson	24	51.2	- 0.1	66.5	36.6	1.57	10	- 1.91	0.58	7	198.5
Blenheim	12	50.8	+ 0.3	68.1	30.4	2.04	9	- 0.28	1.00	3	212.3
Hokitika	12	47.8	- 0.3	61.2	32.9	6.66	14	- 2.36	1.10	23	152.9
Hanmer Springs ..	1225	47.5	+ 1.6	72.3	25.0	3.41	10	- 1.18	0.93	27	171.4
Christchurch	22	50.2	+ 1.5	69.9	31.7	1.94	10	- 0.07	0.43	2	185.2
Ashburton	323	49.0	+ 2.0	72.4	30.0	3.01	9	+ 0.45	1.11	4	182.5
Timaru	56	49.2	+ 1.4	71.6	31.2	2.54	8	+ 0.63	0.73	4	187.3
Alexandra	520	47.9	+ 1.1	71.2	25.0	0.75	8	- 0.06	0.29	9	183.4
Taieri	80	47.0	- 0.7	72.8	29.3	2.60	14	+ 0.53	0.66	4	
Invercargill	32	47.5	+ 0.6	67.0	28.0	4.89	17	+ 1.46	0.90	23	157.2

Radio Broadcasts

RADIO broadcasts to farmers will be given from Station 1YA Auckland at 7.15 p.m. on the following dates:—

November 1—"Current Farming Problems," by C. R. Taylor, Fields Instructor, Rotorua, and E. R. Marryatt, Fields Instructor, Whakatane.

November 8—"Vaccination of Calves against Contagious Abortion," by I. G. Watt, Veterinarian, Department of Agriculture, Auckland.

November 15—"The Wasp Menace," by C. R. Paterson, Apiary Instructor, Hamilton.

November 22—"Young Farmers' Clubs session," by S. Freeman, Dominion organising secretary, Wellington.

November 29—"Rural Sociology in the United States of America and its Future in New Zealand," by D. Viggers, Rural Sociologist, Wellington.

Other talks are given from 1YA Auckland on Tuesdays at 12.35 p.m., 2YA Wellington on Thursdays at 12.35 p.m., and 3YA Christchurch on Mondays at 12.35 p.m. and Thursdays at 7.15 p.m.

PROGENY TESTING OF POULTRY

THE productive powers of a flock of laying birds obviously have a marked effect on the cost of production of eggs. The greater the efficiency of a bird with regard to food consumption and management the lower will be the cost of the eggs produced. For this reason the breeding of high-producing and efficient laying stock is of paramount importance to poultry producers. The raising of the productive level of a commercial flock of laying birds is by no means a simple matter. Knowledge of breeding principles and of a sound breeding programme is essential if a poultry breeder is to attain success. In this article S. G. Haddon, Poultry Instructor, Department of Agriculture, Christchurch, deals with some aspects of progeny testing as a means of obtaining increased production. Frequent reference is made to progeny testing today, but there are still many poultry producers who have only a partial knowledge of this aspect of breeding.

THE objects of all livestock breeding may be outlined briefly as:—

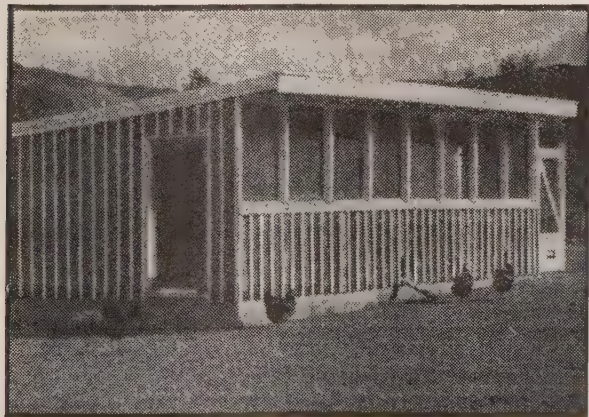
1. Purification of the breed in the qualities desired.
2. Attainment of uniformity in the results.
3. Elimination of unwanted qualities or defects.

Those are the ultimate aims of any poultry-breeding programme whether the aim is excellence on the show bench, in egg production, or in table-meat production.

Purification of breed and attainment of uniformity are set out as the first two objects because it is much easier to get good results from a group of hens (or animals) which all react in the same way to a given set of conditions than to be successful with an equivalent number of hens which differ in some respects such as rate of growth or date of commencement of laying. The attainment of uniformity follows automatically the purification of the breed for any particular qualities. The third object listed is dictated simply by common sense.

There are three breeding methods in general use by poultry keepers:—

1. Birds for a flock mating are selected on their physical appearance and uniformity.



The type of house used at the Poultry Demonstration Plant, Upper Hutt, for testing the productive efficiency of pullets from special pens under a progeny-testing breeding programme. This house has two compartments each carrying 50 pullets, all half-sisters by the same male bird.



[Green and Hahn Ltd. photo.]

In appearance this cockerel may be satisfactory, but what will he pass on to his progeny? Only progeny testing can indicate his real worth.

2. Birds are selected on the basis of their performance as shown by trap-nest records and then mated in a pen headed by a selected male bird—pen mating.

3. Individual birds are selected on the basis of trap-nest records for individual stud mating.

The first method is used most widely in New Zealand.

Much experimental work has been done overseas on breeding, and one of the conclusions has been that selection of stock on a physical basis alone is useless as a means of improving a flock beyond a limited stage. Though that appears to conflict with the old dictum that "like begets like," it really does not, because like birds do not necessarily beget like progeny. Actually it is like genes that are passed from one generation to another. Genes are the building blocks of hereditary make-up.

Performance and Quality

It is a mistake to think that a bird's performance and quality depend entirely on heredity; in most cases they are the result of management, environment, and such uncontrollable factors as a spell of good weather during the brooding and growing period. Investigators have concluded that environment and management have a 60 per cent. influence on the quality of a bird and heredity a 40 per cent. influence. This helps to explain why selection on a physical basis alone is not sufficient to raise flock standards above a given level—a level which has already been reached in New Zealand.

It is now more widely accepted that the only way to select breeding birds is by breeding from them to find the type of progeny which they will produce. That is known as "progeny testing," though the term is slightly confusing, because the parents are being tested, not the progeny. The performance of the progeny is the actual test of the parents or of that particular mating. The performance of the progeny is the key to the whole system.

Main Weakness in Breeding Systems

It is important to realise that it is useless to test matings by comparing carefully-selected samples of the progeny, because such a procedure is almost sure to give a false answer. The testing of selected progeny only is the main weakness in present-day breeding systems, particularly with the larger farm animals such as dairy cattle. The only true sample of the progeny of a mating is a group taken at



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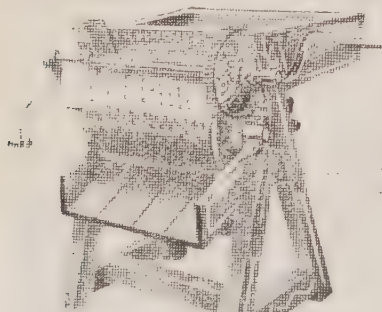


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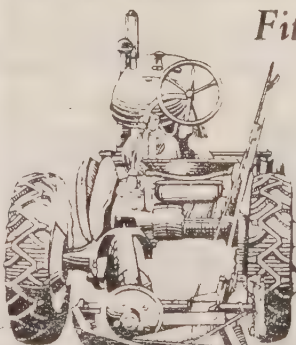
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random—for example, the first 40 calves, piglets, or chickens. There are various reasons why it is very difficult to progeny test a breeding cow, mare, or hen, but the main difficulty is to get sufficient sons or daughters from the dam to ensure a true test. This does not apply to the same extent to pigs, which can have two litters of 11 or 12 suckers a year, but it is still difficult to get a true picture of a breeding sow's worth.

However, it is easier to arrive at an assessment of the value of a male breeder. If a male bird is mated to 15 hens in the course of one hatching season, it is possible to obtain 50 to 60 daughters of that male. Forty-five to 50 daughters hatched in one season can be regarded as a good sample of any male bird's progeny, and the results obtained from the daughters can be regarded as true and unbiased by management and environment.

An endeavour should therefore be made to obtain groups of pullets in which each group has a common sire and to compare the performances of these different groups. To get results which are as true as possible it is necessary, too, to select female parents at random. This should be done by catching the required number of female breeders and rejecting only those with physical defects such as slit eye, roach back, wry tail, and crooked toes.

The comparison of the results obtained from the various groups should start in the incubator room, where the fertility and hatchability of eggs from the test pens should be noted. For the first year egg size and shell quality will be similar for all pens if all the hens come from one flock. The normal selection of hatching eggs should be made, but in subsequent years egg size and shell quality should be points for comparison. Even at the incubation stage it should be possible to reject one or two lines under test on the ground of poor hatchability and heavy early mortality. Progeny from these rejected matings will not be wasted, because they are at least as good as the average flock mating.

To be worth progeny testing a male

bird should give at least 85 per cent. hatchability of fertile eggs.

It will be necessary to hatch eggs so that there is no possibility of confusion in identifying the chicks with a particular sire. Toe punching or wing banding can be used to mark chicks. If necessary, test groups can then be reared with chicks from the ordinary flock matings until mature. They should then be housed in their respective groups—all daughters from one sire in one house.

In addition to the 50 test pullets from each mating it is also necessary to keep about 20 cockerels, because some cockerels will be required for the breeding programme.

Record of Egg Production

When the test pullets are housed in their respective lots records of daily egg production should be kept for each house. Check weighings of egg samples should also be made during the winter and late summer. It does not follow that the house which produces most eggs supplies the cheapest eggs; food consumption has to be taken into account and there are two ways of doing this. One is to weigh all food which is consumed by the different houses so that at the end of the production year the weight of food consumed by each house is known; the other method is to give all houses the same amount of food—wet mash, greens, and grain.

If the second method is adopted, a pen of birds may not produce to their full capacity, but they will produce to the maximum possible on the amount of food consumed.

Where all houses are getting the same amount of food comparison of efficiency in food utilisation is still possible, as it is reflected in the egg production. Adult mortality will penalise the house concerned, because egg production per bird will be lowered and food consumption per bird will be raised. Of course all deaths and cullings from the day-old stage onward should be booked against the mating

... PROGENY TESTING OF POULTRY

concerned and considered in assessing the pen.

Final Assessment

The final assessment of the test pens will show which male bird has the best record and this sire is used again. His sons (half-brothers of the pullets giving the best all-round result) head the breeding pens for the next year, being mated to their half-sisters, which means in-breeding, but there is no objection to that. It also means a hen-cock bird mating for special test matings, as cockerel-pullet test mating would give only limited information.

It must be remembered, however, that the special test pens are maintained for one purpose only: To find by test the best male line with which to work. The ordinary flock matings of cockerels and hens may still be made, but the make-up of progeny from flock matings will be a year or two behind those of the special pens. In any case any improvement in performance brought about in the test pullets automatically shows itself later in the flock performance.

BOOK REVIEW

British Agricultural Bulletin

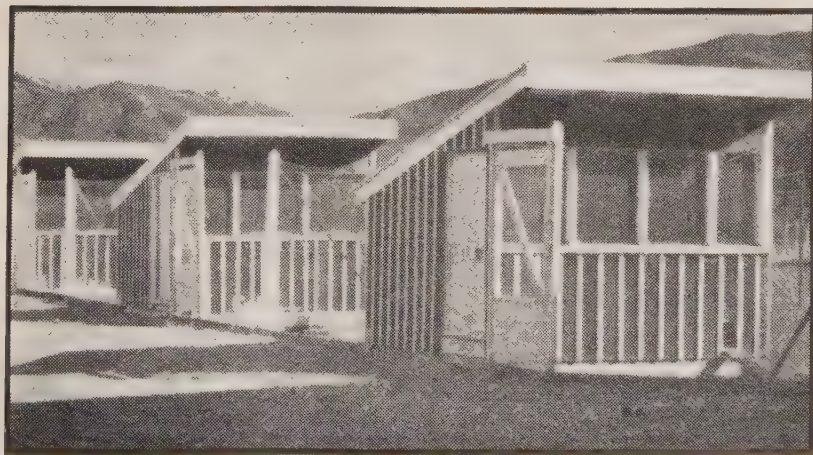
THE purpose of the British Agricultural Bulletin, as stated in an introduction to the first issue (spring, 1948), is: "... merely to put British knowledge and experience at the disposal of the farmers and citizens of other countries." It is a well-illustrated publication produced quarterly by the British Council.

Included in the first number are articles by Professor J. E. Nichols, University College of Wales, Dr. R. O. Whyte, Director, Commonwealth Bureau of Pastures and Forage Crops, Professor J. A. Scott Watson, Director-General, National Agricultural Advisory Services, and Chief Scientific Adviser, Ministry of Agriculture, and Sir E. J. Russell, former director of the Rothamsted Experimental Station.

British Agricultural Bulletin is not intended to meet the needs of the specialist research worker in relation to detailed knowledge in a particular field: It aims to give some account of such scientific discoveries and technical developments as seem to have reached, or to be approaching, the stage for application in farm practice; it intends to deal with experience in education and extension and advisory work, and it is to include discussions on developments in agricultural credit, co-operation, land tenure, rural economics, and rural sociology. Throughout it is written in language intelligible to the layman.

The British Council, London, 5s.

Local representative of the British Council: J. Bostock, Government Life Insurance Building, Wellington C1.



Special breeding pens used at the Poultry Demonstration Plant, Upper Hutt, for progeny testing.

SCHOLARSHIPS IN THE MARKET MILK INDUSTRY

THE opening of a new era of technical advance in the market milk industry of the Dominion was heralded by the passing of the Milk Act, 1944, after the findings of the Milk Commission were announced in the same year. Technical advance, however, is of little use unless the technical education of personnel advances with it, and the Government, through the Central Milk Council, has decided to make available to suitable intending entrants into the industry various scholarships, a summary of which follows.

MARKET milk scholarships, or bursaries, are of three kinds, all tenable at Massey Agricultural College, Palmerston North, and are offered for the coming academic year in the following numbers:—

Bachelor of Agricultural Science degree (Dairy Science option)—3 scholarships.

Diploma in Dairying (market milk option)—5 scholarships.

Milk Technicians—5 scholarships.

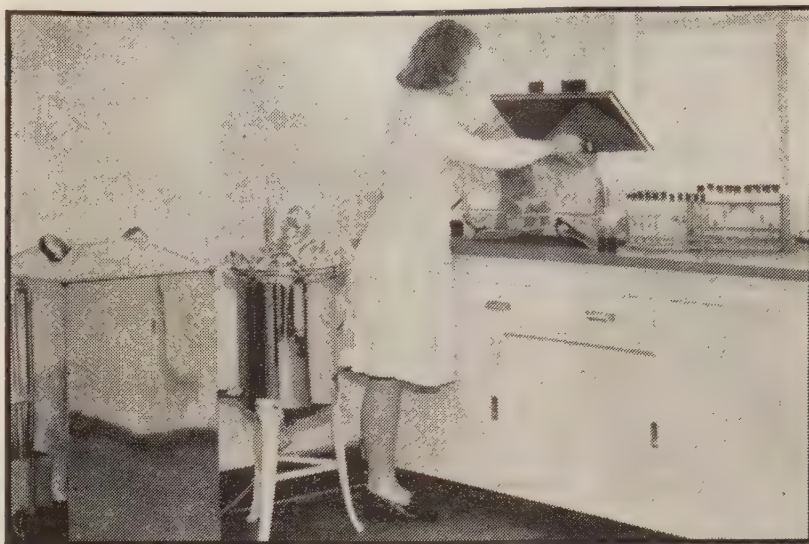
Degree Course

The scholarships offered for the degree course are each worth £280, paid at the rate of £100 during the first professional year and £60 during each of the three succeeding years of the professional course. Candidates are normally required to have completed the intermediate examination for the B.Agr.Sc. degree. In exceptional cases a scholarship may be awarded to a candidate who before commencing the intermediate course has worked in a market milk plant for not less than 6 months. Candidates must be between 18 and 35 years old, and they will be selected by a committee set up by the Central Milk Council.

It is envisaged that a successful scholar, after graduation, would be well fitted to take charge of a medium or large market milk plant laboratory, and after further practical experience to work his way to a position of managerial responsibility in any of the larger plants in the country.

Diploma Course

The scholarships offered for the Diploma in Dairying are each worth £100, payable in three instalments (£30 for the first term of the course and £35 for each of the remaining two terms). The three terms of this course can be completed in one, two, or three years, the usual period being two years. Candidates are normally required to hold the school certificate, and it is preferable that they should have spent at least 6 months in a market milk plant. Applicants who can show evidence of exceptional ability or marked aptitude may have



[Jack Welsh and Sons photo.]
In the laboratory of Dunedin's new milk-treatment station.

these requirements modified in their favour, provided application is received from them by December 1 of this year. In the case of married applicants an additional payment of £5 per week may be made while the bursar is attending Massey College. This payment applies only to diploma scholarships awarded in 1949.

The age limits for diploma scholarships are 18 to 35 years, and selection will be made by a committee set up by the Central Milk Council.

It is hoped that successful students who gain their Diploma in Dairying (Market Milk option) will make use of their training to work their way up to foremanships in large plants or managerial positions in other plants. Their going higher, as several previous diploma men have done, depends on their personal abilities.

Milk Technicians

Milk technician scholarships are intended primarily for girls who wish to take up a career in the laboratories of the various market milk plants. The work is novel and interesting and should appeal to the girl who likes a job rather out of the common.

Applicants for scholarships must be holders of the school certificate and must be over 18 years of age on February 1 in the year in which the course commences. The course occupies one academic year of three terms, the first term commencing late in February and the last term concluding early in November. The scholarship is worth £112 10s., plus free travelling warrants to allow the bursar three return trips from home to Palmerston North. The selection of bursars will be made by a committee appointed by the Central Milk Council.

Milk technicians, after qualifying, can accept appointments to market milk plant laboratories, and the following rates of salary will apply:

18 years of age at the date of appointment, £225 a year.

19 years and over, £250 a year.

Depending entirely on the girls' efficiency and the degree of responsibility undertaken, this salary can rise to £350 a year.

Though no guarantee can be given that a girl will be fortunate enough to gain an appointment to a depot near her home town, every assistance will be given for her to do so if she wishes.

Applications and Closing Dates.

It is suggested that young people interested in applying for the market milk scholarships should get fuller details from the Registrar, Massey Agricultural College, Palmerston North, or the Secretary, Central Milk Council, P.O. Box 829, Wellington C1. Application forms are obtainable direct from the Director of Education, Wellington C1, from whom fuller particulars may also be obtained.

Applications for the milk technician scholarships and the diploma scholarships close on December 1, but applications for the degree course on October 1. Applications arriving after October 1 this year may be considered, but application should be made as early as possible.

The prospects of employment and advancement in the Market Milk Industry for successful bursars are bright. There is a big rebuilding and re-equipping programme in operation, and 10 new market milk plants are planned for erection within the next three years. These and other market milk plants will be equipped with modern machinery and up-to-date laboratories, and successful graduates in all three courses will have the opportunity of entering a largely reorganised industry.

DANGERS OF LEAD POISONING OF CATTLE

By I. G. McINTOSH, Toxicologist,
Department of Agriculture Animal
Research Station, Wallaceville.

ALL forms of lead compounds are dangerous to both young and mature cattle, and unfortunately all classes of cattle often show a definite liking for such materials. Lack of realisation of this danger can and does result in loss of animals, and in this article some of the ways in which stock gain access to the lead compounds in common use on farms are discussed.

FOR over 40 years the dangers of lead poisoning in stock have been the subject of warnings by the Department of Agriculture, but in spite of these the number of cases being brought to light at present is greater than ever before, and it is likely that even more occur without being suspected of being due to lead. Losses of stock from this cause can, by the exercise of reasonable care, be cut to a minimum, with not only a cash saving to individual farmers, but also the elimination of one of the drains on national productive capacity.

Losses are due not only to carelessness, sometimes by a previous occupant of a farm, in the disposal of materials containing lead compounds, but also to lack of realisation of the potential dangers of what might reasonably be regarded as safe practices in the handling of lead paints and other compounds containing lead.

It is important to realise that lead and its compounds are extremely poisonous to cattle and, in fact, are quite as dangerous as arsenic. As little as a fiftieth of an ounce of red lead, a piece about the size of a green pea, is a poisonous dose for an 800lb. cow.

Pigs, sheep, and horses are not so susceptible and are not attracted like cattle by these materials. It is not known why lead should be so attractive to cattle, but the fact remains that they do lick and chew all types of lead compounds. In paint materials it is probable that the accompanying linseed oil is an added attraction, but even scraps of metallic lead are readily eaten.

Burial the Only Safe Method

Nearly every farmer knows the dangers of the old paint or red lead pot and takes care to put it out of the way of cattle, but many do not realise that it retains its dangerous properties permanently. Thus many cases of poisoning occur through cattle gaining access to rubbish dumps where old pots have been thrown many years before. Long-forgotten lumps of dried-up red lead are left on the ground when sheds are burnt down or destroyed, or fragments are swept out when sheds are cleaned up.



The only safe method of disposal of paint pots or lumps of red lead is to bury them deeply in the ground. The dire results of failure to bury such material deeply are exemplified in a case where the loss of four, two, and six calves respectively in three successive seasons was found to be due to the ploughing up and partial uncovering of a small tin of white lead which had been buried just below the surface.

The licking of freshly-applied paint or red lead priming also takes toll of cattle and calves, and in a recent case the red lead applied to the joints of a water pipe was licked off by two cows and caused their death.

In yet another case calves licked the primed joints of some new wooden gates with similar results. It is not commonly realised that old, dried-up paint, and especially flaking paint on wood or metalwork, can be dangerous, but at the Animal Research Station at Wallaceville cases have been handled where such sources of lead have been responsible for losses. Calves in particular, beside licking such surfaces, often chew at painted woodwork with the inevitable result. In one case investigated five out of twelve calves died in three days, and it was found that deaths in similar circumstances had been occurring for the previous ten years in the particular paddock. The lead was obtained by the licking of flaking paint on the woodwork round the base of an old building in the paddock. The assistance of a Departmental veterinarian was not sought until the farm changed hands in the tenth year, but it is probable that the cause of the mortality would have been traced earlier if he had been contacted.

It is advisable, therefore, to seek the assistance of a veterinarian or stock

inspector in all cases of unexplained deaths of stock. They have the facilities for confirming suspicions of lead poisoning, thus helping to save further losses from the same source.

Greater Hazards for Calves

Calves present a special problem, as, to facilitate feeding, they are normally kept in a paddock handy to the milking shed which is very often a dumping-ground for all sorts of broken-down implements, old cars, painted timber, and a miscellany of rubbish. Hence calves are often exposed to greater lead hazards than are mature cows. It seems that both young and old animals can remain in a paddock for long periods before touching a source of lead, but once they acquire the taste or habit they will continue to lick or chew the particular material.

Calves in particular, therefore, should not be pastured in paddocks containing any form of lead-painted material, nor should they be allowed access to implement and other sheds.

Further proven dangerous materials are the lead bars and plates of accumulators, scraps of metallic lead liable to be left lying about after a plumbing job, tarpaulins which have been painted, and arsenate of lead containers. Symptoms produced by all the compounds mentioned do not always agree with those described in handbooks on cattle diseases, and are often partially or completely absent or alternatively are so like those of other diseases as to make recognition of the condition difficult for the layman. However, if the farmer exercises care and intelligence in the use and disposal of lead-containing materials, the need for diagnosing this form of poisoning will not arise.

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PASTURE ESTABLISHMENT

REFERENCES



PASTURE MANAGEMENT

DAIRY DIVISION

DEPARTMENT OF AGRICULTURE



[Desgranges Studios photo.]

FOR the first time since the outbreak of war, the Department of Agriculture staged a comprehensive exhibit at some of this year's winter shows in both North and South Islands. Much reorganising and preparation of material was necessary before the shows because the Department's pre-war show equipment was destroyed or damaged in the early war years by a fire in the building in which it was stored. The aim of the exhibit was to bring before the community, and farmers in particular, the work carried out by each division for the betterment of farming in New Zealand and to convey, in as simple a form as possible, the results of investigational work and instruction about how these findings could be put into practice on the farm.

IN Auckland Province the exhibit was erected at the Waikato and Te Kuiti shows. Every division of the Department was represented and each erected an attractive display depicting the work of its officers. Town patrons showed the same keen interest in the exhibit as did farmers.

The field instructors demonstrated seasonal variation in pasture growth and the normal feed requirements of a dairy cow by means of a painted mural which formed the main background of this section. In the foreground pasture turves were arranged to illustrate good and bad management, and another set of turves demonstrated the essentiality of using good strains of grass and clover seeds and of sowing on a well-prepared, firm seed-bed when establishing a pasture.

The Soil Fertility Research Station, Hamilton, displayed a model laboratory where the Department's agricultural chemists demonstrated methods of testing soils for acidity and phosphate, potash, and calcium requirements and of determining the calcium content of lime samples. The station's weed section displayed the most common weeds which are troublesome to farmers and demonstrated the success which has been achieved in control with hormone weedkillers.

The Seed-testing Station, Palmerston North, showed the methods used to determine the worth of strains of ryegrass and white clover seed with an ultra-violet ray lamp and picric acid tests. Farmers were shown the service available from this station to protect them from sowing poor-quality seeds.

The Animal Research and Livestock Divisions staged exhibits demonstrating the use of penicillin as a cure for mastitis; measures to be taken to prevent facial eczema and the effects of the disease on carcasses of sheep; the vaccination method used to prevent contagious abortion in cattle; and the method of raising healthy calves by grazing them ahead of the dairy herd. The wool section of the Livestock Division showed the treatment of a wool clip to produce first-class fabrics, and the poultry section demonstrated the flock improvement plan with the type of birds required to bring about an improvement in the Dominion's poultry flocks.

The Horticulture Division's display depicted seasonal work in the orchard. Four murals showing the orchard seasons made a colourful background; varieties of shrubs and hedge plants were arranged to set off the exhibit, and a collection of varieties of fruit made this a most interesting section for the orchardist and home gardener. Officers of the division gave information on all subjects concerning orchards and gardens, such as spraying, pruning, manuring, and the selection of the most suitable varieties of shrubs and fruit trees for different districts.

The main exhibit by the honey section of the Horticulture Division consisted of a working model of an extractor and honey house. This exhibit drew much attention, as did a frame of live bees working under glass and a wasp's nest and specimens of wasps.

The Dairy Division's display emphasised the necessity for cleanliness with utensils. Instruction in cleaning milking machine and separator parts was given by Farm Dairy Instructors, and methods of cleaning milking machine rubber to extend its life were demonstrated.

For the Rural Development Division's display the machinery section demonstrated the importance of lubrication and maintenance of farm implements. Of particular interest to women was a display of modern kitchenettes suitable for farm homes, arranged by the rural sociology section of this division, which also demonstrated labour-saving devices and gave instruction on the preparing and making of patterns for dressmaking in the home.

The Departmental exhibit at both shows revealed to the public the vast amount of research work being done by the divisions to assist in solving farmers' problems, and it also gave many farmers a chance to make contact with the research workers and field officers of the Department to discuss their individual difficulties.

—E. B. GLANVILLE, Assistant Fields Superintendent,
Department of Agriculture, Auckland

WESLEY COLLEGE, Paerata, Auckland

THERE ARE VACANCIES FOR 1949 IN
FORMS 1, 2 AND 3.

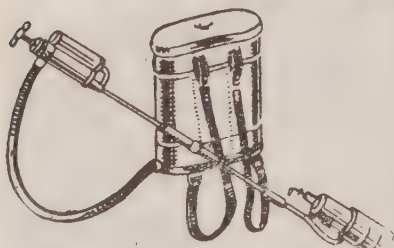
This is a registered Boarding School, under the control of the Methodist Church of N.Z. Boys are prepared for School Certificate and University Entrance Examinations. Courses are: Professional, Accountancy, Agriculture. In addition to the Core subjects, the following are given special attention: Music (piano and choral—Instructor, Mr. Claude Laurie); Art, Woodwork, Horticulture, Animal Husbandry, Divinity.

The College has a farm of 400 acres (Dairying, Sheep, Timber). Seven new classrooms are in course of erection. Full opportunity is given for participation in Football, Cricket, Tennis, Soft-ball, Table-tennis, Swimming (in College baths).

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Spray Equipment for Glasshouses

By J. H. WATT, Orchard Instructor, Department of Agriculture, Dunedin.

FEW producers of glasshouse crops in New Zealand carry out systematic measures to control diseases and pests, and in this article ways and means by which growers can increase production through improved technique are suggested. Some of the more debilitating diseases and pests affecting glasshouse crops can be prevented or controlled by timely and efficient application of recommended specifics.

TO spray thoroughly efficient machinery must be used—that is, machinery or equipment which will give adequate nozzle volume and pressure without delays through break-downs or too much loss of time in refilling the spray container.

The size of the equipment will vary considerably with the amount of crop to be sprayed, and as most crops grown under glass are fairly tender and will be damaged under high-pressure spraying, equipment capable of maintaining a pressure of 100 to 200lb. at the nozzle would be sufficient for even the bulkiest plants, such as tomatoes.

On the average commercial glasshouse property one hose should be sufficient to spray the crop thoroughly without undue delay.

Types of Equipment

Types of equipment are:—

Stationary outfit, suitable for large glasshouse projects. It should be relatively simple to set up a stationary outfit powered with an electric motor, and the pipelines to each house could serve the dual purpose of spray lines and water lines. For spraying, high pressure taps with hose fittings should be spaced at convenient distances along the pipeline within the house and by

using a relatively-short length of pressure hose and a short rod or gun with angle nozzles and instant cut-off, spraying would be light work. A turncock could be fitted to allow water from the central cistern or pressure main to by-pass the pump when the pipeline was required for watering.

Portable outfit, suitable for average glasshouse areas in New Zealand. A low-powered petrol motor of $\frac{3}{4}$ h.p. to $1\frac{1}{2}$ h.p. would drive a small pump capable of maintaining a nozzle delivery of 2 to 3 gallons a minute at good working pressure to feed one hose. Tank capacity could be reduced to from 15 to 30 gallons. The whole outfit could be mounted on two wheels and thus be readily moved about. With a narrow wheel base of about 3ft. such a machine could be operated with short hoses within the house or as a semi-stationary outfit with a long hose from outside each house.

Powered barrow-type sprayer: This also would be suitable for normal glasshouse areas. It consists of a 12½-gallon galvanised metal tank mounted on a steel frame with a pneumatic-tired wheel. The pump, which is single acting with porcelain-lined cylinder capable of delivering two gallons a minute at 225lb. pressure, is mounted over and forward of the tank.

The engine, of $\frac{3}{4}$ h.p. and air cooled, is mounted forward of the pump—that is, over the wheel—thus giving a good balance and low centre of gravity.

The handles are adjustable so that the overall width may be reduced to 16in., which is an advantage when work has to be done in a confined space in many glasshouses.

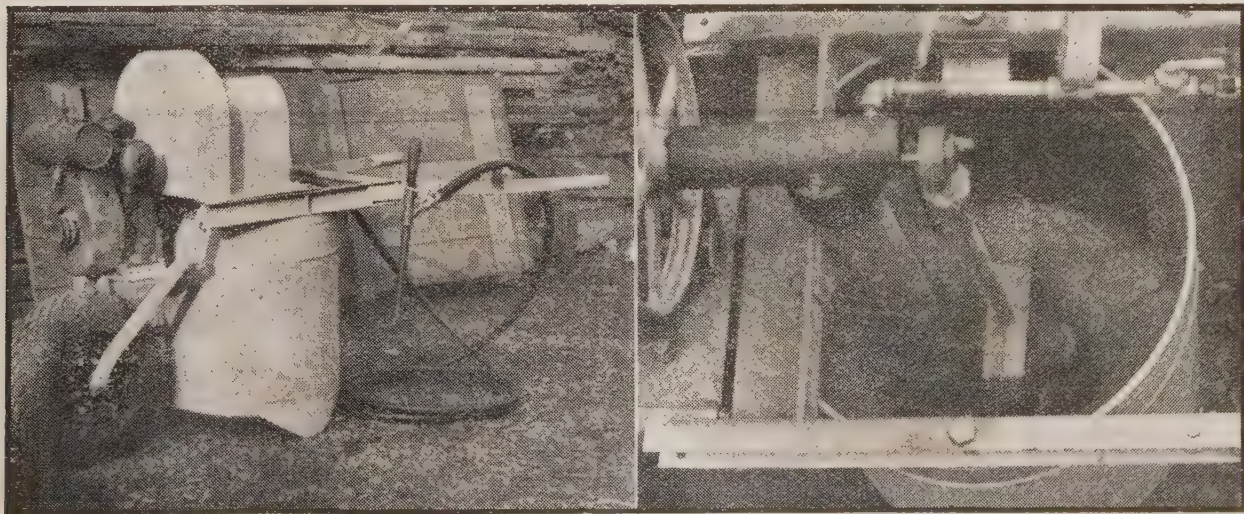
The above three types of equipment are relatively costly compared with manually-operated types, but the effective results from less effort, the speed and thoroughness of application, and the long life, together with the fact that they can be operated efficiently by one man, outweigh any initial disadvantage of higher cost.

Manually-operated barrow type. knapsack, or bucket pumps, which are normally adequate for smaller glasshouse areas, have the disadvantages that they are tedious and laborious to operate. Furthermore, the barrow and bucket types require two men to operate them and much more time is lost in refilling and spraying, even when adequate pressure can be maintained.

Barrow type: This consists of a 12- to 15-gallon capacity open galvanised bucket on which is mounted a single-acting, lever-type, hand-operated pump. The whole is mounted on a tubular-type barrow chassis which combines mobility and light weight. Adequate pressure for most crops can be obtained when this type of equipment is kept in good order.

Knapsack sprayers of the modern type have double-action lever pumps which maintain a continuous, moderately-high pressure.

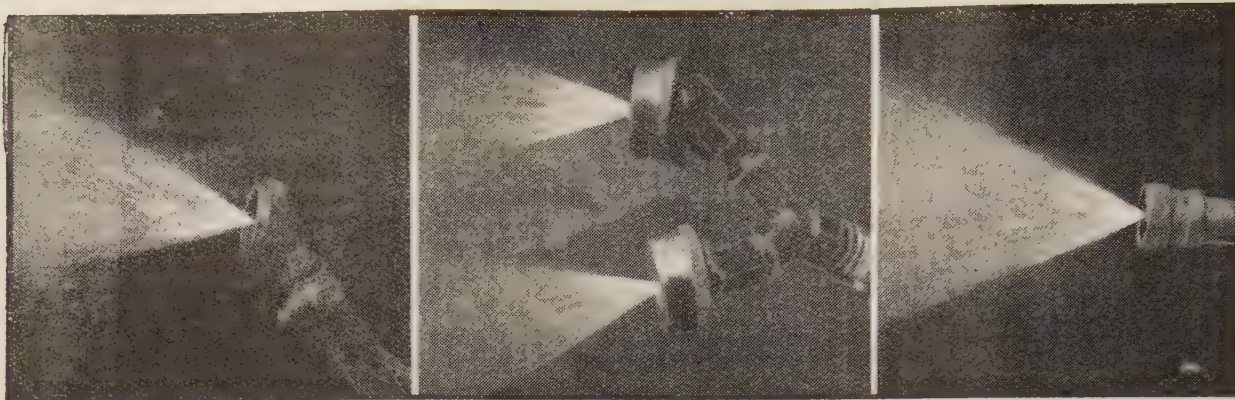
These are particularly suitable for small crops but not for large areas, when the small capacity (3 gallons) causes much waste of time in refilling



[Green and Hahn Ltd. photos.]

Left—Powered barrow sprayer which can be operated by one man. With adjustable handles, the machine is suitable for glasshouse work or small outside spraying jobs. Right—Interior of the spray vat of the same machine, showing how the agitator is operated from the pump.

SPRAY EQUIPMENT FOR GLASSHOUSES



[Green and Hahn Ltd. photos.]

Left—Spray gun in action. Middle—Y head with two angled cyclone nozzles gives a wide coverage. Right—One-angle nozzle showing direction of spray.



[Jack Welsh and Sons photos.]

Left—A knapsack duster with lever action and shoulder straps which is particularly suitable for tall-growing crops such as grapes. Right—Electric compressor-type sprayer suitable for selective spraying. The small spray container is filled with an adjustable nozzle and air pressure is supplied through a long lead attached to the "gun."



[Jack Welsh and Sons photos.]

Left—Hand sprayer. The long hose fitted with strainer is placed in the spray container. The extension may be fitted to facilitate spraying of tall crops or to reach subjects at the back of benches. Right—Rotary fan duster (with attachments) suitable for lower-growing crops. Spray delivery can be to the rear if desired.

However, one man should be able to spray efficiently a large number of glasshouse plants and obtain adequate disease control, provided the time factor is not important.

Bucket pumps are normally of the stirrup type with a double-action hand pump. It is difficult with this type of equipment to maintain adequate pressure without gross fluctuations, and because of the low volume of delivery inadequate coverage usually results and there is great loss of time. However, such equipment is useful where only small spraying jobs are necessary.

For delicate subjects, as in greenhouse plant propagation and the growing of tropical species in hothouses—normally these are not bulky plants—a double-action, syringe-type hand pump may be useful and adequate. A continuous flow of spray is drawn up through the hose, which is inserted in the bucket or spray container.

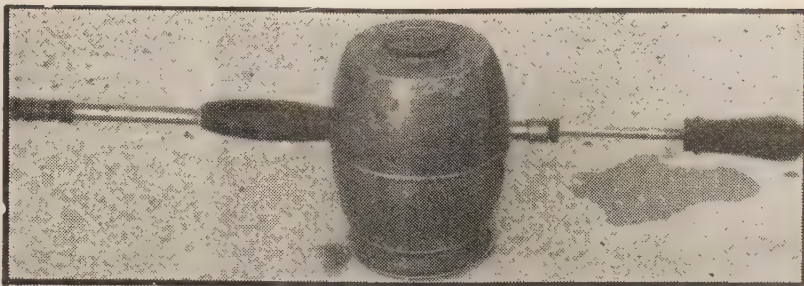
Another advantage is that one man can operate the pump and there is little need to carry the heavy spray container if a long suction hose is used.

For special work and for delicate subjects the equipment described below would be well worth while if much spraying in small lots is to be done. Designed for the application to tomatoes of hormone sprays to encourage setting of fruit, the equipment is a good insurance against poor crops in areas where sudden cold weather may bring about loss of a truss of fruit overnight, especially in glasshouses where heating equipment is not efficient enough to counteract violent reductions of temperature.

The design is based on that used in the construction of paint-spraying outfits, and the equipment is made portable by mounting it on four small cast-iron wheels. It consists of a $\frac{1}{4}$ h.p. electric motor driving a compressor mounted on a cast-iron cylinder in which air is compressed. A turncock fixed under the air cylinder regulates the pressure.

A long pressure tube feeds air to the spray gun, which is a quart metal container with a screw-type lid on which is mounted the trigger and nozzle. A long lead with three-prong adapter plug allows the machine to be pulled along the centre path, and as spray

SPRAY EQUIPMENT FOR GLASSHOUSES



[Jack Welsh and Sons photo.]

A hand sprayer very suitable for syringing or spraying subjects in the small greenhouse.

coverage of the crop proceeds the adapter is changed to other power points.

The nozzle, which is of an adjustable type, will give a spray ranging from a fine mist with little penetration to a coarse, driving droplet, so that plants of all degrees of tenderness can be treated. Where individual plants are to be selected for treatment a light shield can be fitted behind to prevent spray driving on to adjacent plants which may be of a species liable to damage.

The great advantage of the equipment is its mobility and the fact that one man can do selective spraying, while thorough spraying can be achieved even of fairly large subjects by moving parts of the plant with the free hand. The main disadvantages are its restricted uses and the small spray container.

Application of Dusts

In addition to spray equipment, it is an advantage to have some equipment suitable for the application of specifics in the form of dusts, especially since the use of D.D.T. as an insecticide has drawn attention to the value of dusts. The use of dusts on commercial glasshouse crops is at present confined mainly to grapes.

Probably the best equipment for the application of sulphur dusts is the knapsack type with double-action lever air pump, which ensures an even stream of dust through the hose and nozzle on to plant parts up to 16ft. from the ground.

Another type of dusting machine is that driven by rotary fan action through forward- or back-delivery light metal tube and fishtail nozzles, but this is more suitable for lower types of growth.

For small numbers of plants the hand duster will be found quite suitable. This has a container for specific to the top of which is fitted a small air pump of the plunger type which forces air across the top of the container, drawing dust into the air stream and forcing it out through the nozzle in a continuous cloud.

Spray Nozzles

Spray nozzles should be of the cyclone type, which ensures fine mist spray with penetration; with the older type of nozzle it was often found that

penetration could be gained only with the loss of fineness of spray. Angle nozzles should be fitted, as they ensure complete coverage with a minimum of effort; usually two small nozzles on a Y head are more satisfactory than one larger one.

Hose and Rods

The length of hose will vary with the set-up in glasshouses, but there should be enough to reach all parts of the house and all the plants in it without any effort to stretch the hose. Rods should be short so that the operator can turn about between rows without damaging plants and at the same time spray the plants from all angles.

All rods should be fitted with instant cut-offs so that time and spray are not wasted.

Other Equipment

The spray shed should be large enough to house equipment and provide ample room in which to mix sprays. It is essential to have adequate vessels in which to mix sprays, a series of reliable measures—accuracy is essential, as too much specific may damage and too little may be ineffective—and plenty of shelves and pigeon-holes where specifics and spares for equipment can be tidily arranged.

It should be remembered that:

1. Clean mixing vessels and equipment are essential for efficiency.
2. Accuracy in measuring out the specific is essential to success.
3. Sufficient spray should be used to cover the plants thoroughly. A job half done is often a waste of time and money.
4. The spray vat should be emptied after each day's spraying or when changing to a different spray and all equipment thoroughly washed out with clean water.
5. All wooden vessels should be stored full of water; metal ones should be stored empty.
6. All bearings should be oiled before storing equipment.

Growers of glasshouse crops in any doubt about disease identification or control are urged to consult officers of the Horticulture Division, Department of Agriculture, whose services are free to both commercial and domestic producers.



[Jack Welsh and Sons photo.]

A hand pressure sprayer in which pressure built up with the pump is controlled by the trigger.

IMPORTANCE OF CLOVER'S ROLE IN



EVER since grassland farming started in New Zealand the main objective on most of the country's 31,000,000 acres of pasture land has been the securing of a permanent, high-producing sward, writes S. H. Saxby, Agrostologist, Department of Agriculture, Wellington. Under some conditions short-rotation and temporary pastures are essential to fit in with local farm practices, but most farmers hope for relatively long-lived pastures. Ideally, such pastures are those that will produce the greatest quantities of butterfat and fat stock. Whether the farmer is aware of it or not, all his pastoral farming efforts are directed toward the conversion of "dry stock" country to "wet stock" country—an objective simple of expression, but often very difficult or impossible of achievement. The means of attaining that objective can be summed up in one word: Clover.

CLOVER is the all-important ingredient of New Zealand's grassland. The prosperity of the country's farming can be linked very closely with the ability of its farmers to grow better clover on more of its grasslands. That fact is becoming more and more widely recognised by farmers throughout the country, whether they are on the plains or the hills.

When farming began in New Zealand there were no clovers in the country. Now there are 20 or more clovers or allied plants that have become of significance in one part of the country or another. Some will grow under very wet conditions, others under very dry conditions; there are annual clovers and perennial clovers. Some are more useful than others, but none is wholly useless.

Place in Farming Practice

On the poorest and driest country, such as riverbeds and dry shingle plains, the annual clover called haresfoot trefoil (*Trifolium arvense*) grows in association with low-fertility grasses such as hairgrass and browntop. It is not relished by stock, but it must be of some value, even though

slight, as a slow builder of fertility. Its presence indicates the lowest state of fertility occupied by any of the clovers in this country. (The term "fertility" includes the all-important aspect of moisture content, which alone often determines what plants can be grown in a place.)

Suckling clover (*Trifolium dubium*), or trefoil as it is commonly called, is the most widespread of all clovers, being common over much of the poorer country from one end of New Zealand to the other. It permeates the tussock country from Marlborough to Otago, it occupies open spaces in down-country pastures, and it is often present even in the best pastures. Its production is small and the plant is short lived, but it is nevertheless very valuable on country where no other clover can grow without top-dressing.

In the warmer districts two other annual clovers are fairly common on medium- to low-fertility country, striated clover (*Trifolium striatum*) and clustered clover (*Trifolium glomeratum*). Both are more productive than suckling clover, but are not nearly as widespread, particularly in the colder areas. Several other relatively-unimportant annual clovers grow under somewhat similar conditions, but are not so widespread.

On some of the wet, saline areas another annual known as reversed clover (*Trifolium resupinatum*) plays an important, but very temporary, localised part. There it is as useful as any annual clover can be in preparing the way for something better.

Similarly, *Lotus hispidus*, another annual plant, was found to be a very valuable pioneer in parts of Auckland Province, particularly in the early days of bringing in the gumlands. *Lotus hispidus* is of much less value now, as it is possible to establish a useful, permanent clover at the outset.

On much of the limestone country another clover-like plant, black medick (*Medicago lupulina*) or English trefoil, is plentiful. This plant is a short-lived perennial and provides a fair amount of feed that is relished by stock. In the past it was sown to a certain extent, but its sowing is not recommended now, as it is well established on country to which it is suited.

Closely related to black medick are two very similar plants called burr clover, *Medicago arabica* and *M. hispida*. These are strong, vigorously-growing annual plants that come in as volunteers in high-fertility pastures in the



In bringing in the gumlands of Northland a clover was essential. For many years *Lotus hispidus* was the best that could be found, but now with Certified white clover and Certified perennial ryegrass good pastures can be formed rapidly and maintained.

NEW ZEALAND GRASSLAND FARMING

warmer districts. They are usually regarded as weed plants because they take up space that can be occupied by better clovers.

All of those clovers and clover-like plants grow and spread quite successfully without much assistance by surface sowing or manuring, but most of them will respond to good treatment. Suckling clover, for example, responds very well to topdressing with phosphate, but it is most unlikely that topdressing to encourage the production of suckling clover would pay anyone.

On the whole, the clovers mentioned represent the best that can be expected on various types of low-fertility land or on land where the type of farming tends to encourage the perpetuation of the annual rather than the perennial plant.

Subterranean Clover

Subterranean clover (*Trifolium subterraneum*) could quite well have been grouped with the clovers mentioned because, under conditions of low fertility, it is a comparatively-poor plant. However, most farmers quite rightly have come to regard it as extremely valuable on much of the drier country where plants such as suckling clover, clustered clover, and striated clover are growing.

Though subterranean clover will grow in a number of districts without the addition of lime and phosphate, it has been found that the use of either or both is usually necessary for the best production. The other annual clovers also respond to lime and phosphate, but the great value of subterranean clover is the very much greater response it can make. The value of subterranean clover is therefore largely in its ability to use added phosphate and lime better than any of the other annual clovers. On much of the second-class country throughout New Zealand subterranean clover represents the best that can be achieved at present with any type of annual clover. It is the only one that has enabled "dry stock" country to be converted to "wet stock" country on a permanent basis. Because of its free seeding habit, subterranean clover once properly established becomes virtually permanent. The permanence of subterranean clover depends on its ability to set seed freely and to re-establish itself each autumn, so a series of dry seasons or unduly-heavy autumn grazing can have a marked effect on the amount in a pasture.

Valuable as subterranean clover is, however, it must



The South Island tussock country, with its low rainfall and cold winters, is very deficient in clovers, so any marked improvement in carrying capacity is extremely difficult to achieve.

always be regarded as a clover that is paving the way for something better. Just as the presence of, say, clustered clover indicates that subterranean clover will grow there with topdressing, so must subterranean clover be regarded as a step toward the establishment of a perennial clover. Subterranean clover must therefore be regarded not as an end, but as a means to an end—the establishment and maintenance of a high-producing perennial clover.

In most districts in Australia where long periods of summer drought are experienced the survival of a perennial clover is impossible, so an annual has to be relied on. Experience has shown that of all the annual clovers none is better than subterranean clover in practically all but the driest of those districts. Many strains have been evolved, from the early-flowering types such as Dwalganup which suit the driest areas to the late-flowering types such as Tallarook which suit the high-rainfall areas where the dry summer period begins later. There is also a strain of subterranean clover that is proving valuable in Australia on very wet country, and field trials with it are to be laid down in the near future.

Perennial Clovers

Of the perennial clovers the most common are alsike clover, red clover, strawberry clover, and white clover.

Alsike is really a short-lived perennial plant and is suited chiefly to high-fertility land and lax grazing in cold districts. Because of its very limited value its use in New Zealand pastures is unlikely to increase.

Red clover, on the other hand, will grow under a wide range of soil and climatic conditions and its use is being extended continuously. During the past few years, particularly in seed-producing districts, Montgomery red clover has been very widely used. Red clover has two main virtues: Its prolific growth, which makes first-class hay, and its ability to produce good late-summer and autumn feed, as it is not as susceptible to drought as are most other clovers. A considerable proportion of the recent increase in the stock-carrying capacity of some of the rolling clay country of the South Island can be credited to the use of red clover.



Throughout the higher-rainfall areas *Lotus major* has proved an extremely valuable plant on hill country, and also on low-lying swampy country. By growing up and through logs and stumps it encourages stock to graze areas that they would otherwise neglect.

CLOVERS IN GRASSLAND FARMING . . .

Though some strains will last in pastures for a number of years, all have the disadvantage of being relatively short-lived. With a really-permanent type of high-producing red clover a tremendous advance in grassland farming would be possible. As it is, reliance must remain on the truly perennial clovers or clover-like plants—that is, those that with suitable treatment will last almost indefinitely. In New Zealand there are just three such plants: *Lotus major*, strawberry clover, and white clover.



Burr clover thrives under conditions of high fertility and where annual reseedling is possible. Consequently it is often a bad weed in pastures harvested regularly for seed.

Lotus major is adapted to moist conditions and is becoming increasingly common in higher-rainfall areas from North Auckland to south of Invercargill. It has the great advantage of growing well in areas to which it is suited without the necessity of topdressing. Though it does respond to topdressing, it is practically the only clover or clover-like plant worth sowing extensively on country that is not likely to be topdressed. *Lotus major* is also valuable in the reclamation of peat and other swamp country.

Another closely-related plant, *Lotus corniculatus*, is present in various parts of the country, but its value has not been decided. It seems to thrive on country that is drier or better drained than that on which *Lotus major* will grow, and it is possible that the *Lotus* species range may be extended by its use. Trials with this species were laid down during the past autumn.

For many years strawberry clover has been regarded as the best clover for swampy or saline country. That opinion is still held, and rightly so, but it is not generally recognised that under some conditions, the exact nature of which is not yet properly defined, strawberry clover will grow

well in very dry soils, and that it remains green there long after all other grasses and clovers have been burnt up by drought conditions.

Country's Most Important Plant

Unquestionably white clover is the most important plant of any kind in New Zealand—more important than any other clover, or any grass, or any native or introduced forest trees. This humble, almost insignificant, little plant is nationally of infinitely-greater value than the rarest horticultural novelty. It is responsible in no small degree for much of New Zealand's annual production of up to 200,000 tons of butterfat and for the well-being of 15,000,000 sheep that are killed as "fats" each year.

The growing of good white clover is the objective of any farmer who wants to fatten more stock or produce more butterfat. Healthy, vigorous white clover marks "the end of the road" as far as present knowledge of pasture production reaches. The value of pastures is assessed primarily by the extent to which white clover is thriving in them. White clover is so much better than the rest of the clovers because it is permanent—at least the Certified strains are; because of its high production; because it associates well with and assists the growth of the best pasture grasses through its ability to fix atmospheric nitrogen; and because it makes better use of phosphate and lime than do any other clovers.

Relative Values of Clovers

The following table endeavours to classify clovers into those that grow in high- and low-rainfall areas and into those that give worth-while responses to topdressing and those that do not warrant topdressing:—

	Moist- to wet- summer country	Dry-summer country
With topdressing	White clover <i>Lotus major</i> (of secondary im- portance) Red clover (temporarily)	Subterranean clover White clover Red clover (temporarily)
Without topdressing	<i>Lotus major</i> Some white clover Strawberry clover (on swamp land) Burr clover (in some seed-pro- ducing districts) Reversed clover (on some saline land)	Suckling clover Striated clover Clustered clover Haresfoot trefoil Stunted subterranean clover Stunted white clover Burr clover Black medick <i>Lotus hispidus</i>

This classification must admit of some variations. For example, burr clover and subterranean clover grow remarkably well on high-fertility, moist country. The important and generalised features are:—

1. On well-drained and fertile country topdressing pays only when white clover is the objective. *Lotus major* is occasionally useful under these conditions, particularly on hill country.

2. On good country which cannot be topdressed *Lotus major* is a most valuable plant, white clover taking second place. The remaining clovers in this section are of only localised value.

3. On dry country it pays to introduce and topdress for subterranean clover, particularly with the hope that white clover will also be of value in the sward in the future.

4. On dry, untopdressed country low-producing annuals are the best that can be hoped for, and under those conditions "store" feed is the best that can be expected.

In the farmer's struggle for more pasture production it is essential that he has at the back of his mind the question of getting clovers into his pastures. First come the low-producing annuals that survive without topdressing; then, with topdressing, subterranean clover can play its part, to be replaced in time by white clover in many cases.

Progress in pasture improvement can be judged by the farmer's ability to grow the best possible clover on his property, and of all the clovers in New Zealand only two are really worth while over large areas: Certified



Of all the clovers that have been introduced into New Zealand white clover is undoubtedly the best in all respects, closely followed by subterranean clover.

white clover of pedigree strain and subterranean clover. *Lotus major*, which is also extremely valuable, is not strictly a clover.

One of the major pasture problems of New Zealand at present is the introduction of clovers into the hill country. In the North Island there is considerable hope of success, but in much of the colder and lower-rainfall tussock country of the South Island no answer is yet in sight, though the problem has been under investigation for a number of years.



PRODUCTION RECORDS OF ARTIFICIALLY-BRED HEIFERS

By J. P. JAMES and S. A. SOUTHCORBE,
Department of Agriculture Animal Research Station, Ruakura.

DURING the past few years considerable work has been done on the technical side of the problems confronting the application of artificial breeding to the best advantage in New Zealand. In the progress of this work sufficient cows have been artificially bred from each year at the experimental artificial breeding centre at the Department of Agriculture's Animal Research Station at Ruakura to provide heifers for testing the validity of the breeding principle upon which this work has been planned. The productions during the first lactations in 1947 of heifers born as a result of these artificial matings are compared in this article with those of mature cows in the same herds in which they were reared and milked and with the official survey records on which the bulls were selected.

THOUGH it may be generally agreed that the selection of a bull for transmitting producing ability to his daughters on pedigree or appearance alone is a gamble, most of the element of chance is excluded if a bull is selected on the actual records of all his daughters. This has been the basic principle behind the selection of bulls for artificial breeding work at Ruakura. Bulls with the necessary butterfat backing, taking into account productions from all daughters, have been located through the New Zealand Dairy Board's Sire Survey Scheme.

The standard set is an average production on a maturity basis of 400lb. of fat from a minimum of 10 daughters of each bull. In the early years of

the work this standard had to be reduced temporarily to allow the experiment to proceed, but for the past three years the original standards have been maintained.

Selection of Bulls

Bulls are not selected solely on their daughters' production records, but their stock must measure up to standards of breed type as laid down by the New Zealand Jersey Breed Society. The fertility and sexual health of each bull must be examined before purchase. The selection of bulls located at Ruakura is decided by a ministerial committee of three members, one from the New Zealand Dairy Board to locate the bulls which come up to the prescribed standard and to check the

records, an officer of the New Zealand Jersey Breed Society who is an experienced breeder to examine the bull and his progeny to ensure that breed type is maintained, and an officer of the Department of Agriculture to examine the fertility and sexual health of each bull. As each member of the committee has the right of veto, unanimous agreement is necessary before a bull can be bought.

A.I. Heifers' Productions

The first field experiments were carried out in 1943 and the first crop of heifers born as a result of these artificial matings completed their first lactation in 1947. Their productions can now be compared with those of the mature cows in the same herds in which they were reared and milked and with the official survey records on which the bulls were selected. These are the first productions available from a group of heifers from proven sires reared and milked under several systems of management and fed on different planes of nutrition, in this way constituting a real test of the practical value of the proven-sire principle of breeding. It may be argued that in small herds and on good land circumstances favour the surveys of bulls which might not be valid on poorer land and in larger herds where less individual attention can be given to each animal.

Heading photograph: A group of artificially-bred yearlings at the Ruakura Animal Research Station.

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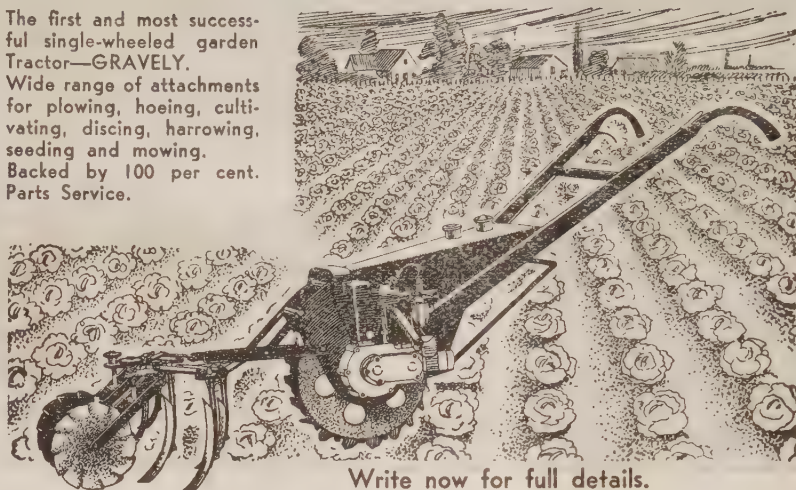
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A farmer remarked to his son,

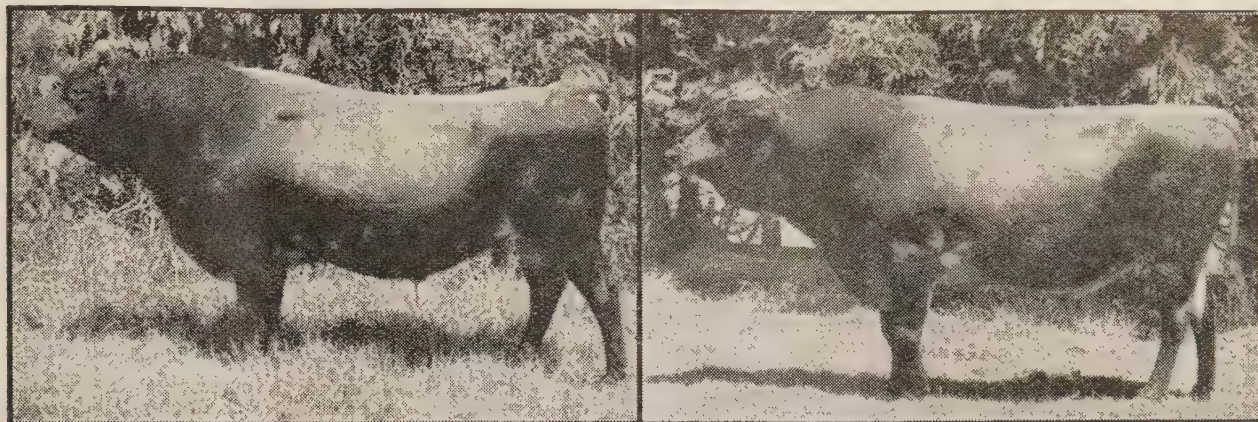
"At the end of the day
I feel done,"

His son said, "That's bad,
Get Marathons, Dad!

Then out in the mud is
just fun."

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PRODUCTION RECORDS OF ARTIFICIALLY-BRED HEIFERS



Two of the three proven sires of the artificially-bred heifers. Left—Greencroft Hope's Prince. Right—Awatea Phil.

The farmers who co-operated in the early field trials represented an average sample of the dairymen in the Hamilton district, whose farming operations might be described as typical of the commercial dairy farmers in the Waikato. The productions shown in the following tables were made solely on grass.

Table I sets out herd by herd the average productions of the artificially-bred heifers of the three proven sires used in the first field trial. Alongside these figures are shown the maturity

equivalents, obtained by adding 70lb. of fat to the heifer productions. Beside the maturity equivalents are shown the average productions for the mature cows, ages from four to nine, in the same herds in the same season.

It will be seen that the corrected productions (maturity equivalents) for the heifers compare favourably with the productions of the mature cows in the same herds. The average (mature) production of the 66 daughters of proven sires was 357lb. of fat compared with 324lb. for all the mature

cows in the same herds in the same season. This is a gain of 33lb. of fat in average producing ability.

Relation of Level of Feeding

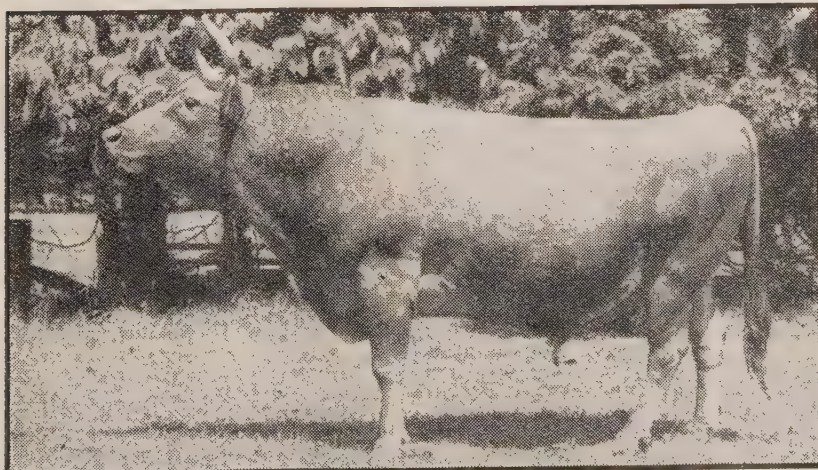
As expected, there are considerable differences in the productions of the daughters of the proven sires in different herds, reflecting the differences in feeding and management. A similar order of difference has been shown in experiments carried out at Ruakura, where groups of artificially-bred heifers were kept on controlled grazing (well-fed plane of nutrition) and uncontrolled grazing (poorly-fed plane of nutrition). The two methods of feeding in the Ruakura experiment would generally be paralleled by the feed position on the well-fed and poorly-fed farms included in the artificial-breeding group. The figures to hand for the same season (1946-47) from this experiment at Ruakura are shown in Table II.

TABLE I—PRODUCTION OF ARTIFICIALLY-BRED HEIFERS BY HERDS

Herd	Heifer calves	Normal lacts.	Production of artificially-bred heifers		Production of mature cows in same herd
			Actual lb.	Mature equiv. lb.	
A ..	16	13	283	353	361
B ..	15	15	305	375	346
C ..	6	6	325	395	339
D ..	13	13	258	328	279
E ..	10	9	286	356	339
F ..	3	3	274	344	279
G ..	7	7	285	355	289
Total ..	70	66	Means 287	357	324

The figures for one herd (H) from which no productions from mature cows are available are:—

H ..	44	39	281	351	—
------	----	----	-----	-----	---



The third proven sire, Kuku Butterking.

TABLE II—RELATIONS OF LEVEL OF FEEDING TO PRODUCTION (Ruakura interim results)

Group	Average butterfat	
	Actual lb.	Maturity equivalent lb.
Controlled grazing ..	291	361
Uncontrolled grazing ..	251	321

In Table III a comparison is made between the official surveys of the three bulls and the productions of the artificially-bred heifers from each.

The productions of the artificially-bred heifers from Greencroft Hope's Prince substantiate the official survey, while the figures for Kuku Butterking fall 18lb. short of the official survey figures and those for Awatea Phil 47lb. short. It will be noted that the number of daughters contributing to the official survey for the two bulls Kuku Butterking and Awatea Phil were considerably smaller than the number of artificially-bred daughters, which may account for some of the discrepancy between the two sets of productions. Such differences must be expected and illustrate the need for setting a very high standard for the bulls used for this work, particularly when bulls are selected on preliminary surveys.

PRODUCTIONS OF ARTIFICIALLY-BRED HEIFERS . . .

The productions from the first group of heifers bred artificially from proven sires can be said to be encouraging, and give promise of distinct improvement in the productive ability of the stock thus bred from proven sires.

Two points should be mentioned: In the first place these results serve to show that artificially-bred cattle suffer no disadvantages on that account, and are quite as healthy and normal in

every way as their naturally-bred herd mates. This is a point which has caused concern in the minds of some farmers. The second point is that the bulls used in this first year's work were not of such a high standard as those now in use, so that better productions may be expected in future groups. If these advantages in proven sires can be maintained in the next few years, a great deal will have been done to establish the confidence of

dairy farmers in these practical results from this system of breeding.

Summing up the position, the results of the first season's artificial breeding work have shown:—

1. That artificially-bred heifers showed a gain of 33lb. of fat over the producing ability of the normal mature cows in the same herds in the same season.
2. That results obtained varied with the herds, probably largely because of variations in the level of feeding and management. The differences in results from the best-fed outside herd and the worst-fed were almost the same as between Ruakura's controlled-grazed (well-fed) and uncontrolled-grazed (poorly-fed) herds.
3. That still better results may be expected with better bulls, but it is clear that better feeding must accompany better breeding for the full value of A.I. to be exploited.

TABLE III—PRODUCTIONS OF ARTIFICIALLY-BRED DAUGHTERS FROM EACH BULL COMPARED WITH THE OFFICIAL SURVEY FIGURES

Bull	Total A.I. daughters	Normal lacts.	Actual prods. lb.	Mature equiv. lb.	Final official survey Daughters	Product. lb.
Greencroft Hope's Prince ..	41	38	301	371	52	373
Kuku Butterking ..	43	40	285	355	13	373
Awatea Phil ..	30	27	270	340	14	387

PEDIGREE SOW RECORDS

Contributed by the Livestock Division.

Breed Averages for the Period

DURING the five months April-August, 1948, 25 of the 31 litters recorded were sufficiently good to be included in one of the five grades set out below:—

Grade	Minimum Litter Weight	
	At 3 weeks	At 8 weeks
1	120lb.	360lb.
2	100 "	300 "
3	90 "	270 "
4	80 "	240 "
5	70 "	210 "

Breed	No. of Litters Recorded	Litter Weight at		Number of Pigs		Average Weight at	
		3 weeks (lb.)	8 weeks (lb.)	Born	Weaned	3 weeks (lb.)	8 weeks (lb.)
Berkshire ..	14	99.2	265.4	8.1	7.0	14.17	37.92
Tamworth ..	5	103.4	294.6	9.0	7.6	13.61	38.76
Large White ..	11	114.3	324.7	12.0	9.9	11.53	32.75
Large Black ..	1	147.0	452.0	12.0	12.0	12.25	37.67

A No. 3 grade is regarded as good, No. 2 as excellent, and No. 1 as special.

The following list gives the names and addresses of the breeders of recorded sows and details of the litters:

Owner's Name and Address	Herd Book No. of—		Litter Weight at		No. of Pigs		Grade of Litter
	Sire	Sow	3 weeks (lb.)	8 weeks (lb.)	Born	Weaned	
Berkshire							
Larsen, O. C., Aorangi, R.D. Feilding	23002	22797	130	377	11	11	1
Larsen, O. C., Aorangi, R.D. Feilding	19492	22999	109	279	9	8	3
Ashleigh Stud, R.D. Tayforth, Wanganui ..	21107	22175	156	375	11	9	1
Pohangina Pig Club (Secretary, T. J. Spelman, R.D. Ashhurst)	21226	19540	98	281	9	9	3
Ellerm, O. C., R.D. Palmerston North	22745	22744	103	211	9	6	5
Ellerm, O. C., R.D. Palmerston North	22742	22551	87	265	8	7	4
Ellerm, O. C., R.D. Palmerston North	22745	22741	58	164	5	4	—
Ellerm, O. C., R.D. Palmerston North	22745	21789	101	269	5	5	4
Harley Estate, Nelson	23018	22413	68	191	8	7	—
Hodgkinson, H. E., Rotomanu	18295	18278	67	257	9	6	—
Hodgkinson, H. E., Rotomanu	18295	20718	72	228	7	5	5
Revell, A. W., Mangatoki	22934	21785	113	306	6	6	2
Revell, A. W., Mangatoki	22934	19923	141	362	9	9	1
White, H. C., Waimana, R.D. Nukuhou	21358	21675	86	151	7	6	—
Tamworth							
Manship, G. D., Hari Hari	15611	15414	130	344	8	8	2
Manship, G. D., Hari Hari	13754	13728	51	178	10	6	—
Whitlock, G. M., Kairanga, R.D. Palmerston North	13345	15050	170	424	12	10	1
Baker, H. R., Gumtown Rd., Turua	15372	15633	76	204	7	6	—
Fredrickson, G. D., Te Whiti, R.D. Longbush, Masterton	15204	15292	90	323	8	8	3
Large White							
Whitlock, G. M., Kairanga, R.D. Palmerston North	6807	6965	111	271	10	8	3
Whitlock, G. M., Kairanga, R.D. Palmerston North	7091	6307	132	339	8	8	2
Whitlock, G. M., Kairanga, R.D. Palmerston North	6807	7235	171	471	16	13	1
Haydon, G. C., "Silverst," P.B. Greymouth	7013	6410	98	263	13	10	4
Haydon, G. C., "Silverst," P.B. Greymouth	7013	6354	78	229	13	8	5
Haydon, G. C., "Silverst," P.B. Greymouth	7013	7376	91	300	12	12	3
Hill, H. E., Awaiti, R.D. Paeroa	6908	6861	169	461	14	14	1
Baker, H. R., Turua, Hauraki Plains	7168	6595	89	293	12	6	4
New Plymouth Boys' High School, Box 187, New Plymouth	7261	7287	136	413	13	13	1
Rowlands, T. E., Ruthin, R.D. Kaiapoi	6515	7254	91	316	10	9	3
McLean, C. J., P.B. Greymouth	6129	6984	96	216	11	8	5
Large Black							
Jensen, H. H., Table Flat, Apiti	5304	5148	147	452	12	12	1

Establishing Pampas Grass in Southern Hawke's Bay

IN the past failure to establish pampas grass successfully has resulted in low production from some plantations and has caused this valuable crop to fall into disfavour with some growers. This article by F. J. S. Holden, Fields Instructor, Dannevirke, gives information gathered from official trials and farmers' experiences which should be of assistance to prospective growers in Southern Hawke's Bay.

WHEN a site for a pampas grass stand is being chosen the first considerations are the soil and the level of the water-table. Though pampas grass can be established on a wide range of soils, one which is free draining and easily worked gives the best guarantee of a good strike. In heavy clays, wet and sticky in winter and setting hard in summer, greater care is necessary and timely cultivation between plants as the soil dries out is essential. A low-lying, water-logged situation is quite unsuitable both for the thrift of the plants and for their being fed off in winter. With thorough cultivation pampas grass can be established under conditions of low summer rainfall, but will frequently fail if neglected.

A central position on the farm should be chosen, allowing entry from several paddocks, so that the run-off can be changed or different mobs of stock fed in turn on the same plantation.

Pampas grass will tolerate an exposed situation, low fertility, or an unfavourable aspect better than most other crops, but will give greater leaf production in a well-chosen site. Frosts of up to 16 degrees have not damaged the foliage.

Establishing a Plantation

In early districts plants can be set in August, but September, when soil conditions are better, is a more suitable month. October planting is risky in dry areas. A reliable nurseryman will supply the best plants, but where possible the largest plants available should be chosen.

The larger the plant, the better are the chances of survival against unfavourable conditions. When plants are received it is most important that the bundles be placed immediately in a creek or pond where they receive a thorough soaking for at least 24 hours.

Following is an easy method of planting out, presuming that the paddock has been ploughed and worked and that little unrotted turf is present: Plough parallel shallow furrows 7ft. 6in. apart with the aid of a marker on the plough, and cross these at right angles with deep furrows the same distance apart. If plants are set on



A six-months-old pampas grass plantation well established as a result of thorough cultivation.

the intersections, practically no digging is required. Set the plants upright to reduce the chance of their being caught by implements. Care should be exercised when ploughing the furrows because uneven width between rows complicates inter-cultivation. Cover the roots carefully and tramp them well. An acre of ground requires 750 plants at this spacing.

In manurial trials in Southern Hawke's Bay during the 1947-48 season untreated plots showed as much growth as plots receiving applications of superphosphate, blood and bone, or a mixture of equal parts of both, applied at the rate of $\frac{1}{2}$ lb. a plant. Instances have occurred of superphosphate in larger quantities injuring plants.

The distance of 7ft. 6in. between plants is most satisfactory for cultivation, allowing a tractor, two leaves of harrows, or small 12-blade tandem disc harrows to pass through the rows in two directions at any time in the first six months. It also allows room for animals to pass between plants without soiling them or doing unnecessary damage.

Cultivation

Inter-cultivation should be started soon after the plants are set out, and the manner in which it is carried out will regulate to a very large extent the rate of growth, and in dry conditions the rate of mortality, in the first year.

Cultivation is necessary for two principal reasons—to control weed growth and to conserve moisture. Unless these factors are watched the growth in most soils will be slowed by at least half and mortality will be high.

The spring-toothed cultivator is a very suitable implement, and if it is too wide, some tines can be removed and the rows straddled; Californian thistle cannot be eradicated by this implement, but can be kept in check. Two leaves of harrows also do a good job if used when weeds are just showing through the ground, and can be used alternately with the cultivator or discs. Small tandem discs are also very effective; this implement tends to bank up earth about plants, which smothers weeds, but at least one hoeing is necessary to pull earth away from plants.

Cultivation in two directions is usually necessary at intervals of four to six weeks, depending on the weed growth and the necessity to conserve moisture.

The next and equally-important operation is hoeing the soil round the plants which is not reached by implements. That should be done at least twice in the first six months, but if the rows are straight and the cultivation is done well, it is not a big task; a man can hoe an acre of plants in four to five hours.

The planting of potatoes or other crops between the rows is considered undesirable. It allows mechanical cultivation in only one direction and increases the amount of hand hoeing, which is then usually neglected, allowing weeds to gain a strong hold, to the detriment of the pampas grass.

By March the plants should be established strongly enough to compete with weeds, and cultivation may cease—in fact, cultivation for a longer period interferes with the surface rooting system.

ESTABLISHING PAMPAS GRASS



Plants set out carefully are easier to cultivate by machinery and require little hand work.

Alternative Methods of Planting

If a farmer cannot carry out the initial working, it may be done by a contractor and plants set in holes dug with a spade. Inter-row cultivation may be done with a horse and scarifier, but should even that not be possible the ground must at least receive regular hand hoeing for about 18in. round each plant during the first six months. A grass mixture spring sown after planting controls weeds and supplies useful fodder if grazed lightly by sheep, but such sowing should not be attempted in districts with a low summer rainfall unless the ground is hoed round the plants.

On country inaccessible to a tractor and implements pampas grass can be established by digging holes and planting it in the same way as trees, provided that proper holes are dug, preferably some weeks before planting, to aerate and break down the soil. Keeping the hoe going is again important.

With such methods growth is slower than with normal planting and the plantation may take three years to reach a stage at which it can be fed off. The reason is that pampas grass has a very extensive surface rooting system, spreading 9 to 15ft. from the plant in the first year if the ground is cultivated mechanically as suggested. That is not possible in consolidated turf, so that the plant feeds on a smaller area until the rooting system gradually forces its way outward.

Sowing with Grass Mixtures

The sowing of a grass and clover mixture between plants when cultivation ceases in the autumn has some features to recommend it. First, if plants are set 7ft. 6in. apart, there will be a considerable area of ground

which may just as well be growing grass as weeds. Second, as sheep can graze the grass without worrying the pampas grass, the time for which the area is lost to grazing can be reduced by at least 15 months. Finally, if vigorous clovers or even lucerne is established, the pampas grass is likely to benefit by the assimilation of nitrogen through the same action as takes place with grasses in a pasture.

Palatable species should dominate in the mixture sown, and one of the following mixtures is suggested:—

Certified short-rotation ryegrass, 30lb., and Certified Montgomery red clover, 8lb. an acre.



Flower heads should be cut out before they burst from their sheaths.

Certified short-rotation ryegrass, 15lb., Certified perennial ryegrass, 15lb., and Certified Mother seed white clover or subterranean clover, 4lb.

Prairie grass, 50lb., and subterranean clover, 3lb.

Subterranean clover alone, 5lb., on light soils.

Replacements

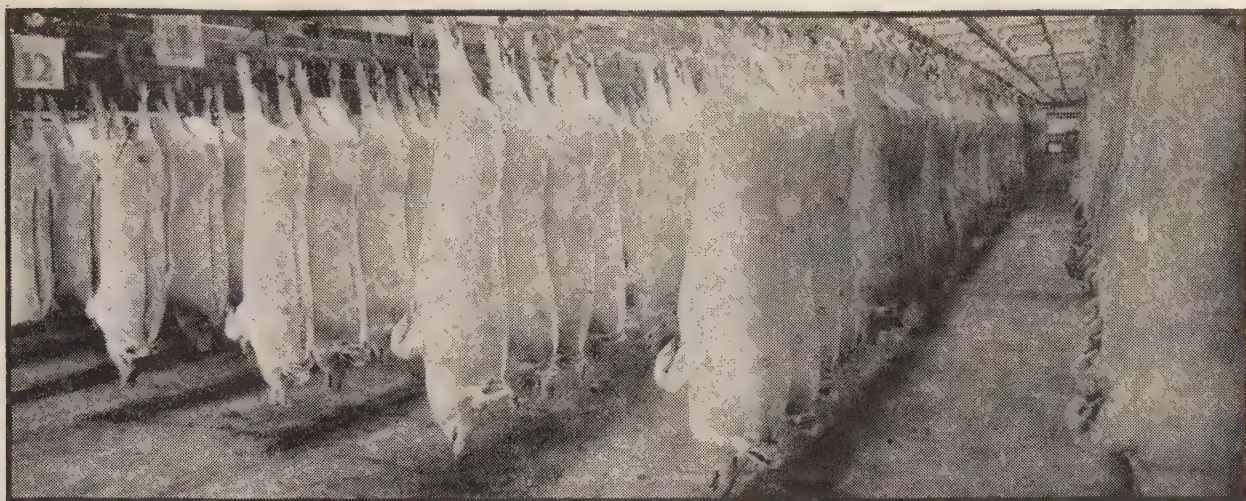
Invariably a few casualties occur in a plantation, from 5 to 15 per cent. loss being not unusual. These should be replaced in November, by which time it is possible to recognise the plants likely to fail. Replacements should be obtained and set beside the presumably-dead plants without disturbing them in case they recover. Autumn replacing is not advised by nurserymen.

It is advisable to make replacements in the same season so that they will be ready for grazing with the remainder of the plantation and not be smothered by other plants.

Deflowering

As with many species of plants, pampas grass produces a flower head and seed at considerable expense to the parent plant, which loses vigour in the process. Therefore in March, before the flowers burst from their sheaths, these shoots should be removed. One or two will grow on most young plants and can be removed easily with a butcher's knife.

In an established plantation cattle will do the deflowering. If fed previously with a few armfuls of seed heads, they develop a taste for them and when admitted to the plantation will strip them from the plants before eating any appreciable quantity of leafage.



[Sparrow Industrial Pictures Ltd. photo.]

Pig Carcass Competitions Help to Maintain Quality

IF, as may be expected, the supply of pig meat increases rapidly when world grain supplies return to normal, the extent of the market for New Zealand pig meat products will be determined by quality. To be successful in the competition for the market, pig producers in the Dominion must look well ahead and consider the parts played by feeding and breeding in the improvement of quality. The importance of carcass competitions in maintaining the interest of farmers in the production of quality meat is dealt with in this article by A. Longwill, Assistant Superintendent of the Pig Industry, Department of Agriculture, Wellington.

AS New Zealand is so largely dependent on the success of her exports in competition with those from other supplying countries, it is natural that producers should be keen to study what is wanted by the consumer and how best the desired type of commodity can be produced. Producers of export meat have been helped in obtaining this information by competitions, which have been held for a number of years. Judgment was at first based on eye appraisal, but later, after research on market requirements in England, judging systems based as far as practicable on measurement have been used.

Measurement systems for pork and bacon carcasses were the first to be developed. As the result of a request made in 1931 for reports to be made on recorded pigs sent from this country a group of experts led by Dr. J. Hammond, of Cambridge University, worked out a system employing measurements as far as practicable to facilitate reporting on these carcasses and to serve as a basis for judging the suitability of pork and bacon carcasses for the Smithfield market.

Smithfield System

This system (called the Smithfield system) was published in 1936, the co-authors being Dr. Hammond and Messrs. H. R. Davidson, J. B. Swain, and N. L. Wright. It was used in a number of competitions in this country during the period between the time the system was published and the outbreak of war in 1939. It involves the cutting of the side at the level of the last rib. This point was chosen because it is the latest-developing part of the carcass, and a part which grows late during the development of the animal forms the best index of the state of

development of the carcass as a whole. Under this system 60 per cent. of the breeder's points are awarded for "eye of meat" and for backfat thickness, together with eye appraisal of the streak for thickness and proportion of lean meat. Twenty points are awarded for length and the remaining 20 for hams, shoulders, and leg-length measurement. In addition, marketing points (15 for porkers and 10 for baconers) and points for weight suitability in baconers (a carcass of from 135lb. to 154lb. being the ideal) are awarded, making the maximum score 115 for porkers and 125 for baconers.

Though it is appreciated that the cutting of the side is essential for an accurate assessment of the meat qualities of the carcass, it involves a trade loss and this restricts the use that can be made of the system. Every effort should be made to employ a system involving measurement on the cut side when recorded pigs for which details of breeding and feeding are available are being judged, but frequently large competitions involving only assessment of carcass quality have to be judged, and for these a system of judging without cutting the side has been evolved.

Post-war Revival of Competitions

During the war most of the competitions conducted by agricultural and pastoral societies and district pig councils were suspended. The Canterbury District Pig Council, however, has maintained continuity, and since 1943 W. and R. Fletcher (N.Z.) Ltd. have sponsored an annual competition covering the whole of the North Island, the entries for which have increased each year. At this year's competition, concluded in July, a record total of 4496 pigs in teams of four were judged.

A number of agricultural and pastoral societies and district pig councils recommenced their local competitions this year, and with centres of interest in these created by field days at Whangarei, Hamilton, Nelson, Christchurch, Dunedin, and Invercargill and, through the North Island championships, at Hastings, Patea, and Auckland, a reasonably-good coverage of the Dominion's producers has been obtained. Competitors and other producers have been able to attend a field day and see their pigs on the hooks. Even if they have not taken a prize, there have been valuable lessons to learn.

Success of Whey-fed Pigs

Perhaps the most outstanding success in all the competitions was the winning by Mr. I. B. Julian, Kakaramaea, Taranaki, of the North Island championships for both baconer and combined teams. In this competition each

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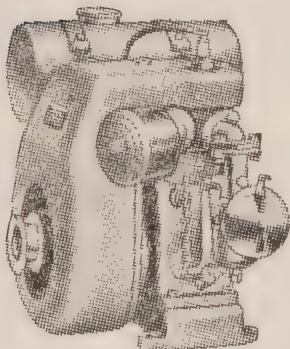
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entry comprised a team of four pigs from one litter, and the prize for combined teams was awarded for the highest total points for a team of porkers and a team of baconers.

Points were awarded according to the New Zealand judging standards, giving a maximum of 100 points per pig for carcass quality. In addition, for each team of four 10 points were awarded for evenness of weight and 10 for uniformity in conformation, making the maximum points 420 for a team.

Mr. Julian's baconer team scored 345 points, a team entered by Mr. W. K. Becroft, Wellsford, being a close second with 343 points and a team entered by Mr. V. Cope, Whitford, third with 342. As Mr. Cope's porker team scored 343 points, one point ahead of Mr. Julian's, there was also very close competition for the combined teams' championship, with the winning group having only two points in hand. However, nine other porker teams had better individual scores than either of these, the champion team, entered by Mr. J. J. Morgan, Pukekohe East, scoring 352 points. The fact that Mr. Cope's team was placed seventh in the district porker competition showed that the entries from the Auckland District Pig Council's area were of a high standard.

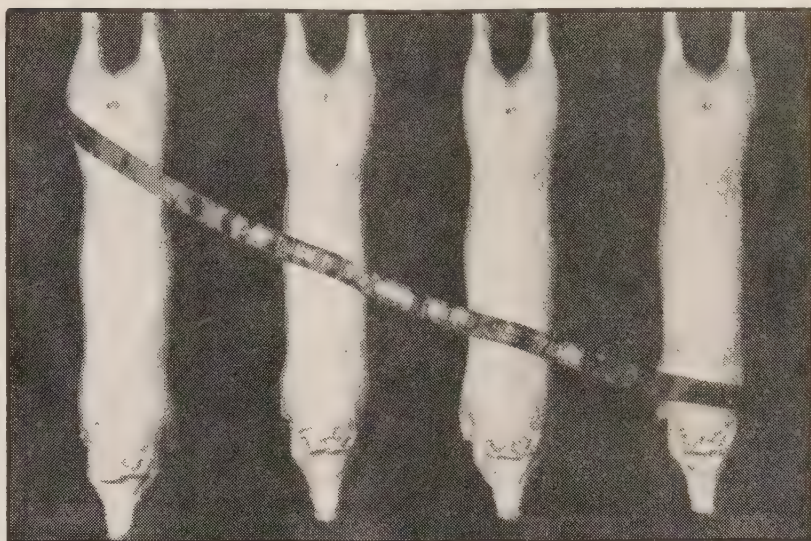
The production of both porkers and baconers (usually from pigs of the same breeding, as is required under practical conditions on most dairy farms) to secure carcasses scoring a high number of points in both teams is a test of the producer's skill in feeding as well as of the inherited qualities of the pigs. This serves to emphasise the important practical point that, with proper attention to feeding methods, highly-satisfactory commercial carcasses can be produced either as porkers or baconers from the same breeding stock. With the essentially-lengthy and lean-fleshing type of pig, the important points are to secure reasonably-rapid growth to the porker stage, say, an 80lb. porker in 18 to 19 weeks, and to restrict feed slightly in the finishing of baconers to avoid overfattening. The restriction should, however, not be too severe, or a soft fat will be produced.

That such high quality in both porkers and baconers should be produced on whey feeding, as were Mr. Julian's, not only indicates the feeding skill employed, but serves to emphasise the value of the all-too-frequently-spurned whey as a basic pig feed. Meal supplements, particularly meat meal, are required, of course, but these high-quality pigs were fed a normal farm ration which has proved an economic one over a period of years. The results of this year's large North Island competition must be recorded as an outstanding success for Taranaki and for whey feeding. The champion team's points have been exceeded in only one previous competition of the series.

Superiority of Large White

The superiority of Large White in both the porker and baconer sections of this competition and the success of its crosses with Berkshire, including the winning of the porker championship, were a repetition of the results

VALUE OF PIG CARCASS COMPETITIONS



[Sparrow Industrial Pictures Ltd. photo.]

Mr. J. J. Morgan's team of Large White-Berkshire cross, winners of the North Island porker championship in the competition conducted by W. and R. Fletcher (N.Z.) Ltd.

last year. This is now becoming accepted as characteristic of all the carcass competitions held in this country. Though Large White "blood" was represented in total entries to the extent of only about 15 per cent., it was prominent in the prizewinners. In these 50 per cent. of the breeding was Large White, with Berkshire and Tamworth producing the bulk of the remaining winners. The frequency with which pure Large Whites were among the prizewinners was remarkable, especially in porkers, where 13 groups were pure-bred. Ten of the prize-winning bacon groups which scored 300 points or better were full Large White. By contrast only two pure Tamworth entries won prizes in the porkers and two in the baconers, and pure Berkshire only one, in the porkers.

These results emphasise that with the lengthy type of pig it is possible by careful feeding to make high-quality porker or baconer carcasses at will. In other words, the normal market demand today is similar for both types of carcass—lengthy, lean-fleshing pigs with light fore-end relative to the rest of the carcass.

Canterbury Baconer Competition

The question may well be asked, "Is the holding of competitions in which only carcass quality is judged of any real value in helping the average farmer in his selection of breeding stock?" It must be emphasised that such competitions are not primarily designed for such a purpose. They are rather a yardstick by which any producer may check up on the type of pig he is keeping and his own skill as a feeder and learn something specific about market requirements. Interested breeders and others

have frequently felt that a more valuable test would be provided if economy of food conversion as well as carcass quality were considered in allotting points.

The true figures for efficiency of food conversion would be difficult to obtain, and as carcasses are produced under varying farm conditions, would be of doubtful value; they are therefore not generally favoured for competition purposes. However, growth-rate in itself can be recorded easily and is most useful in any attempt to compare competition carcasses.

This idea is employed in the Canterbury District Pig Council's baconer competition. Beside the open class, which is judged on carcass points alone, a class is provided for baconers from recorded litters. For this class pigs are accepted from litters which have been recorded either officially or privately, provided the private recording is witnessed and endorsed by two other farmers.

A maximum of 50 points is awarded for litter performance and growth-rate and 100 points for carcass quality as follows:—

	Maximum points
Litter Performance:—	
(a) Pigs weaned—1 point per piglet	10
(b) Litter weight 8 weeks—400lb. maximum (minus 1 point for each 10lb. under this to 300lb., then 2 points for each 10lb.)	20
Growth rate:—	
Daily gain from birth to slaughter of 0.75lb. dressed weight per day or better	20
Carcass quality	100
Total points, recorded section	150

VALUE OF PIG CARCASS COMPETITIONS . . .

Tables for awarding points for litter weight and daily gain are prepared to facilitate allotment of points, and anyone wishing to make use of this method could obtain details from the Canterbury District Pig Council. It should be pointed out, however, that with the growth-rate table at present in use the range extends downward from 0.75lb. to 0.45lb. daily. With a 150lb. carcass this gives a range of from 200 days to 333 days, which could probably be reduced with advantage. If 20 points were awarded for a daily gain of 0.75lb. and one point dropped for each .01lb. less than this, the system would give no points to pigs with a growth-rate of 0.55lb. daily or less. This is equivalent to taking 270 days to produce a 150lb. carcass and no points appear warranted for slower growth than this. The whole scale could be made more selective by raising the growth-rate standard, using the range of, say, 0.61 to 0.80lb. gain per day; that is, the production of a 150lb. carcass in 188 to 246 days or six to eight calendar months.

This conclusion is supported by the fact that prizewinning pigs in this competition this year showed growth-rates as high as 0.84, 0.78, and 0.76lb. daily and at the same time averaged 80 per cent. of the possible carcass points.

Mr. A. J. Jamieson, Koiterangi, Hokitika, was the most successful exhibitor in this section, winning the first and second places. Mr. F. Higgins, of Wakefield, Nelson, was third.

The litter from which Mr. Jamieson's entries were taken was by a Large White boar of the Barrytown Pig Club strain and from a Rotomanu Berkshire sow. All 11 pigs born were weaned, the total litter weight at eight weeks being 451lb. The litter was killed at 207 days; the heaviest pig weighed 161lb. and scored 81 per cent. points for carcass, having, of course, scored the possible on farm points.

Lessons from Competitions

To be searching an assessment of the performance of any pig as a producer of a good carcass must require a reasonably-rapid growth-rate. Those with experience of competitions know that if they start with a well-bred pig, they can produce a carcass that will score a high number of points, but often too much of the credit belongs to the farmer. In order that the test should be applied more to the inherent capacity of the pig a fairly-high standard of growth-rate must be set. In any case, the growth-rate should be recorded to enable anyone interested to make his own assessment of the performance of different individuals. The Canterbury competition is most valuable in maintaining this principle.

As much is to be learnt from the faults of the average run of pigs in a competition as from the outstanding successes, and those competitors who discussed their exhibits with the carcass judges were able to learn where their chief weaknesses lay and to what extent these were inherent in the pigs or how improvements could be effected in their own feeding management.

In competitions this year pigs were somewhat heavier and fatter on the average than in most years, and this has been the general tendency in the industry. The factor of weight suitability for the particular trade should be clearly borne in mind by all producers. This is provided for in most competitions. The ideal weight range for a porker carcass is 70 to 90lb. and for a baconer from about 135 to 155lb. The more the greater part of production can be concentrated within these weight ranges the better it will be for the industry. Competitors in any carcass competition should observe them closely.

Weaknesses which are largely controlled by heredity and which can

therefore be removed only by careful selection of breeding stock are lack of length of side and heavy fore-end in relation to the rest of the carcass. The lack of length carries with it a tendency to overfatness in baconers, but this is a feature which can be controlled by restricted feeding. This may mean that the growth-rate compared with that of the longer, highly-specialised bacon-type pig is lower, but this is inevitable where, as in New Zealand, each producer is forced to produce both porkers and baconers from the same breeding stock.

Selection for length will help meet the requirement of a lightened fore-end. As the shoulders of the average run of New Zealand pigs are heavy because of thickness and depth, increasing length in relation to depth will be of advantage. Where thickness is caused by lean meat rather than fat careful selection methods will be necessary to ensure that lean-meat thickness in other parts of the body does not suffer. Improvement of any part of the body should always be regarded in relation to the other parts, the aim being to secure general improvement in balance.

Principles of Feeding Management

The proportions of lean to fat in the carcass can be greatly altered by feeding management, and the principles to follow are:—

1. Give sows good treatment so that litters have a good start. The tendency for bone and muscle to grow earlier than fat must be fully exploited.
2. Keep the weaned pigs moving without a check (or store period) right up to porker or light-baconer weight to enable full development of the lean meat.
3. Unless the pig is of specialised baconer type, practise restricted feeding over the last month to avoid overfattening.
4. In commercial practice aim generally to draft fat pigs according to their type, using length and finish as the criteria; that is, the shorter pigs are sold as porkers at 70 to 90lb. and lengthy pigs taken to bacon weights.

With a little experience in seeing how pigs measure up after careful feeding along these lines, it should be the exception for a producer to raise any but pigs capable of scoring a high number of points in competitions.

The points awarded for hams in competitions range from about 50 to 100 per cent. of the possible allotted to that section of the carcass. This is to be expected, as this is one character which can be fairly well assessed on the live pig, and entries usually do not include pigs with poor hams. However, there is need for continued improvement in this respect, particularly as selection for increased length and lighter shoulders will tend to make selection for improved hams more difficult.

Competitions help to focus the attention of producers on these aspects, which are all of importance and great value in increasing the efficiency of the industry.



Mr. I. B. Julian's Large White team, winners of the North Island baconer championship. [Sparrow Industrial Pictures Ltd. photo.]

LAYING TILE DRAINS

CERTAIN principles in hydraulics are involved in laying tile drainage, and these principles must be observed if the drainage is to be successful and money spent on draining made to yield the maximum return. They are followed automatically in hand-constructed drains laid during winter when the drains contain water, but when machines are used during dry weather these principles can be overlooked. This article by H. W. T. Eggers, Engineer, Department of Agriculture, Wellington, draws attention to some factors which must be considered when a tile drain is being laid.

THE fundamental aim of farmland drainage is to correct the faults caused by the presence of excess water in the soil by removing that water or lowering its level to a depth where its presence will not affect vegetation adversely.

Water can flow through all soils to some extent, but the downward percolation is very much slower in some than in others. Everywhere beneath the land surface a place can be reached where the pore spaces are filled with water, and the level at which this occurs is the ground water level or water-table. This ground water surface is seldom horizontal, but usually rises and falls with the surface of the ground above it, though with less steep gradients. The greater the distance from the point of natural drainage such as a river or lake, the higher the ground water surface is likely to be; the further this water must travel through the soil to reach the drainage point, the more resistance it must meet and the greater will be the pressure required.

Efficient drainage is a planned system that will lower the water surface over a specified area to a given depth and maintain it lowered permanently.

Mole drains cannot be considered permanent because of soil subsidence, but tile drains may be, as they are not subject to blockage by soil subsidence if properly laid. However, they may become blocked because of

faults in laying, inattention to outfall, and the collection of silt in them.

Two hydraulic principles that must be complied with if drainage is to be efficient are that, given no resistance to flow, water will find its own level, and that any resistance to flow will cause hydraulic head to be built up. For these reasons a tile drain laid to lower the water surface must offer less resistance to the flow of water than the surrounding soil, so that the water will flow to the point of least resistance—that is, the drain. Once having entered the drain the water

must again follow the line of least resistance and flow along the drain in the direction of fall.

If resistance is offered to the passage of water inside the drain, hydraulic head will be built up, causing the pressure to rise above that of water in the surrounding soil, thereby neutralising the effectiveness of the drain. Therefore a tile drain, to be effective, must be free from anything likely to offer resistance to the free flow of the water, such as low spots that can silt up or root growth of trees or shrubs, and must have a continuous fall to the point of outlet.

When the trench to accommodate the tiles is prepared all crumb (loose soil) must be removed so that the tiles will be bedded on firm ground and will have no tendency to subside or become displaced with the weight of the replaced overburden. Peats are not suited to tile drains because they lack firmness of bottom, and great care must be exercised in recently-stumped country.

Water flows into a tile drain through the narrow slits left between the ends of tiles when they are butted together. Sometimes it is considered that considerable space should be left between the ends of the tiles to allow the water to enter, and that the tiles should be short to provide as many joints as possible. As water moves very readily through the joints even when the tiles are butted as closely as possible, every precaution should be taken to make perfect joints so that silt and soil are excluded and prevented from clogging the drain. The



A "dumpy" level in use. Some such instrument is essential to determine correct levels for drainage.



A trenching machine operator working to levels from a levelling tee.

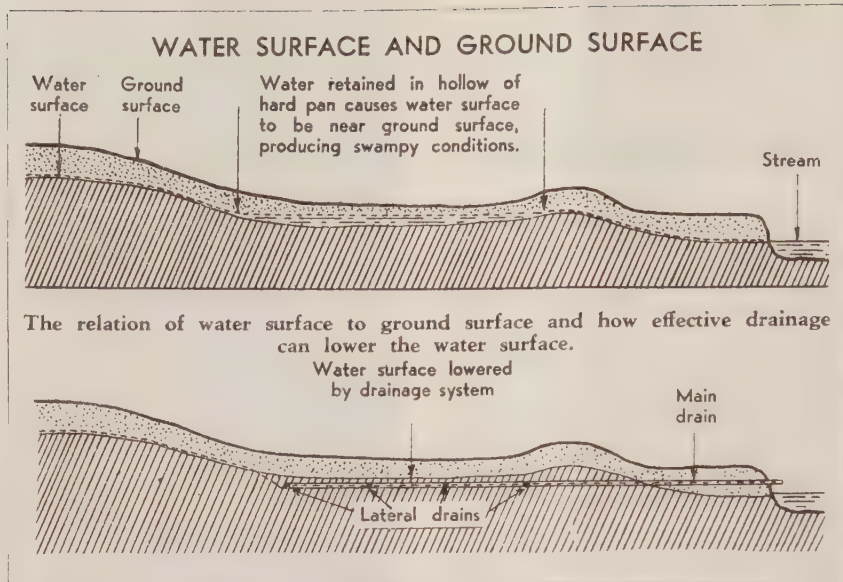
TILE DRAINAGE . . .

possible exception is where the drain is made of concrete tiles, the ends of which are very regular; then a space of, up to 1/16in. may be left.

Machines for Drain Construction

Drains in which tiles are to be laid are usually dug in winter when the ground is soft and other farm duties are not so pressing. Under winter conditions the flow of water which would normally occur in the drain will indicate any low spots and whether the gradient is being maintained. Therefore drains laid by hand are usually both effective and efficient. However, hand digging of drains is laborious and costly, and, moreover, labour for it is no longer available. Conditions have caused machines to be designed that will dig trenches and, in some cases, lay the tiles with a great saving in time and at less cost than similar work done by hand. Such machines are being used in New Zealand by agricultural contractors, as the capital cost of a machine is usually too high to make its purchase by individuals economic except for contract work.

The use of machines permits drainage to be carried out at any season of the year, but machines for this work, as for any other, will not produce satisfactory results unless handled correctly. A drainage machine in the hands of a contractor does not mean good drainage unless the contractor is a specialist in drainage. Work may be performed and tiles laid, the water surface level may even be reduced, but will it remain reduced? The unskilled contractor does not know and at heart may not be concerned, but the cost of the work represents capital investment by the farmer, the return for which must be increased production from the land drained. If the



land is to revert in a short period because of badly-laid drains, the investment will be lost.

Maintaining Level of Trench Bottom

As the machine must follow ground contour, the level of the bottom of the trench which it digs will also follow ground contour unless provision is made for regulating the depth of digging as the machine proceeds. Such a trench would be useless for a tile drain. Some trench-digging machines in use overseas are equipped with automatic depth control which maintains the level of the bottom of the trench independent of the contour of the ground, but as far as is known machines in use in New Zealand do not have this feature, depth

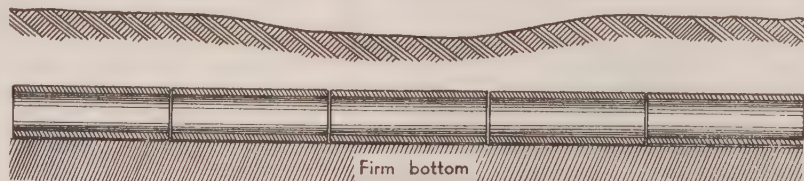
control being entirely in the hands of the operator. Under those conditions it is practically impossible for the machine to dig a trench with a perfectly-even bottom, unless the operator makes provision for grading by the use of boning rods or some other device before starting trenching. Some system of determining levels and setting out grades is essential to enable the operator to regulate the depth of digging so that the machine will produce a trench with a reasonably-even bottom irrespective of ground contour.

Tile drains must have a continuous fall to the point of outlet, where there must be free egress for the water, and the only means of securing data for determining levels accurately is by the use of some sort of level, preferably a "dumpy" level (or a theodolite) and staff. To be able to use this instrument correctly requires some previous training, but by its use accurate level markers such as boning rods, levelling tees, or a grade line can be placed so that the operator of the trenching machine can keep the bottom of the trench to previously-determined levels with reasonable accuracy.

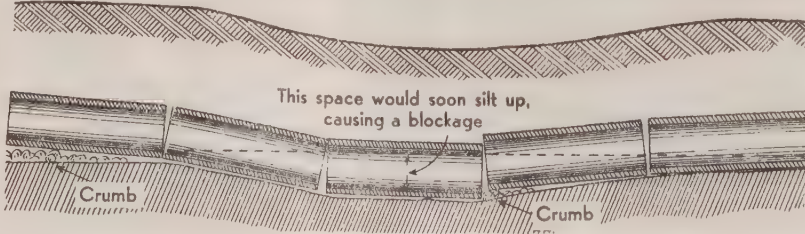
The use of a level is particularly important in fields where falls are very slight or the ground surface is irregular. Tile drains may be laid with a fall of as little as 2in. in 100ft., which is sufficient to cause a flow through the drain provided it is laid evenly and is not subject to silting. Silt traps should be placed at any point where it is necessary to decrease gradient.

Particularly when working under dry conditions, the action of digging equipment causes some loose material to fall back into the trench behind the machine. Tiles should not be laid on crumb or loose surface, but as the removal of this crumb is possibly hand work, its performance or otherwise will depend entirely on the conscientiousness and thoroughness of the contractor.

WELL-LAID AND BADLY-LAID DRAINS



Above—A correctly-laid drain. The bottom of the trench is in the same plane irrespective of the ground contour, the tiles are bedded firmly and butted closely, and crumb is absent. Below—An incorrectly-laid drain. The bottom of the trench follows the ground contour, leaving a low spot in the drain, the presence of crumb causes irregular laying of the tiles, and the contour of the trench prevents the tiles being butted, allowing soil and silt to enter.



Topdressing Surface-sown Grassland

SEASONAL NOTES contributed
by the EXTENSION DIVISION

WHILE the extension of topdressing on surface-sown hill-country pastures is nationally necessary to check erosion and increase carrying capacity and production, it also calls for thought and preparation on the part of the individual hill-country land improver if he is to secure a satisfactory return for his investment. Without such attention the mere scattering of fertiliser, for which both materials and labour are costly, may not achieve the results anticipated.

TO secure satisfactory results the routine of hill-country topdressing should be arranged as follows:—

1. Always topdress the most productive pastures first.
2. Introduce clovers along with topdressing—white clover and *Lotus major* in high-rainfall areas and subterranean clover in lower-rainfall areas.
3. Regulate subsequent summer grazing so that the clovers introduced the previous autumn are allowed to seed.
4. Provide for the maintenance of the pastures already improved before extending operations to new land.

Phosphatic topdressing will achieve very little in the absence of clovers. The danthonia sward shown in the lower illustration is fairly typical of millions of acres of hill-country pasture lands in the North Island; there are areas where the danthonia is associated with more productive grasses and scattered annual clover plants, and also areas where the sward is more open and sheet erosion has left stunted danthonia plants surrounded by bare ground. In all swards of this nature, however, unless clovers are introduced along with topdressing, the effect will merely be to increase the summer growth of the annual legumes present such as suckling clover and to improve the colour of the sward; little or no returns in increased carrying capacity will be secured.

The upper illustration, on the other hand, shows what occurs when white clover is introduced into a danthonia-browntop sward along with topdressing or is present in a stunted form. The whole character of the pasture is changed; stunted ryegrass and dogtail plants become vigorous, or may be introduced by oversowing, and such a pasture is capable of carrying two or three times as many ewes as the sward shown in the other illustration, and will fatten lambs.

Accordingly the programme of hill-country topdressing should be first to topdress the fields where there are still stunted clovers and better grasses. Such pastures will give



[Photo News Ltd. photo.]

an immediate increase in carrying capacity and produce the revenue to extend the practice to the less-productive areas of the farm. Such an increase in stock-carrying capacity must be anticipated and provided for, or the value of the topdressing will be lost. Many improvers on treating such land have omitted in the past to provide the extra stock to cope with the extra feed, and the percentage of lambs fat off their mothers has fallen.

When such pastures have been topdressed the next stage is the introduction of clovers, along with topdressing, into the poorer swards. In high-rainfall areas white clover and *Lotus major* should be used, and in drier districts subterranean clover. White clover should be oversown at the rate of 2lb. per acre and *Lotus major* introduced by patch sowing wherever the ground is loose. Sowings of subterranean clover seed should be heavier and 4lb. to 5lb. per acre is not too much.

On large areas of hill-country grassland the surface is hard and the initial strike of clovers from oversowing is poor. As it is essential that plants which do strike should be allowed to live and seed, hard grazing with sheep should be avoided. Wherever possible cattle should be used for the subsequent year's grazing and stocking should be eased up in early summer to allow clovers, particularly subterranean clover, to seed.

Once the pasture has been improved it should be topdressed annually or biennially to maintain the introduced clovers. Neglect of maintenance may result in a complete loss of the progress previously achieved.

Already hundreds of thousands of acres of hill-country pasture lands have been improved by topdressing and oversowing, but there are millions of acres which still await the hand of the improver. Only through such development can sheet erosion be checked and the increased carrying capacity obtained for the provision of the meat and wool exports necessary for the country's well-being. To do this the hill-country farmer must adopt (and adapt) the improved grassland-farming practices evolved on the plains of stimulating clover by topdressing.

In the wetter districts the introduction of *Lotus major* alone will go a long way toward improving the carrying capacity and fattening qualities of hill-country pastures. Over large areas of surface-sown hill-country pasture lands in the central western districts of the North Island *Lotus major* has been used to improve production, but there are in addition much larger areas where it could be used. All that is required are patch sowings wherever the soil is loose. Sowing must be continued over a period of years and cattle relied on to carry the seed from the sown patches out on to general pastures.



[Photo News Ltd. photo.]

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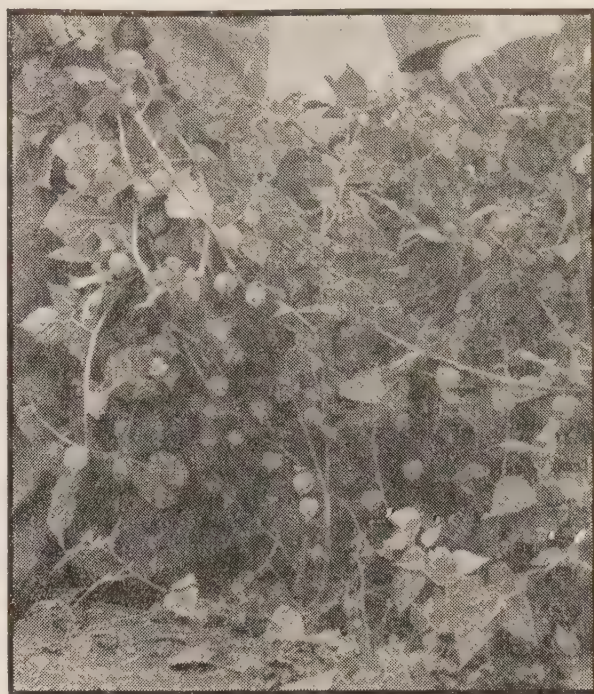
THE GROWING OF CAPE GOOSEBERRIES

Present Demand Exceeds Supply

THE cape gooseberry (*Physalis peruviana*) is grown commercially in few districts in New Zealand, though it should do well in most districts where tomatoes are grown successfully in the open. At present the main commercial areas of cape gooseberries are at Motueka, in the Nelson Province (approximately 70 acres), and in Auckland (approximately 40 acres). In this article J. H. Watt, Orchard Instructor, Department of Agriculture, Dunedin, discusses the culture of the cape gooseberry, which is becoming more popular as a fresh dessert fruit and more widely sought for jams and preserves, for stewing, and for pies. At present the quantity of cape gooseberries produced is not sufficient for domestic and factory requirements.

THE cape gooseberry, a native of Peru, has been cultivated for more than 200 years. In 1725 Feuillec described its cultivation in Peru, where it was greatly esteemed as a preserve. In 1807 Sims (1) described it as *Physalis edulis*—"the edible *Physalis*"—and he wrote: "This plant is a native of Peru and Chile, but it is cultivated at the Cape of Good Hope, in some parts of the East Indies, and more especially at the English settlement of New South Wales, where it is known by the name of 'cape gooseberry' and is the chief fruit the colonists at present possess; it is eaten raw or made into pies, puddings, and preserves." The name *Physalis* comes from the Greek word meaning "bladder" and the fruit is so named because the thin calyx enlarges and encloses the fruit.

The cape gooseberry belongs to the same natural botanical family as the tomato, potato, and tobacco—the *Solanaceae*—all of which are herbs of warm and temperate countries. The various species of *Physalis* are annual or perennial plants, sometimes lightly woody at the base, and of straggling or diffuse habit of growth. They have



[Oandâ Studios photo.]

A satisfactory crop of cape gooseberries nearing maturity.

been cultivated for their edible fruits or their ornamental value—some species have a large, coloured fruiting calyx.

Conditions for Establishment

The production of cape gooseberries is not a highly-specialised business: They will grow on relatively-poor soils, and areas may be established at low cost, to come into production the first year—the season is similar to that for dwarf-type tomatoes. The cape gooseberry is a perennial of bushy habit, which is usually treated as an annual in commercial plantings and for this reason may be of value for inter-cropping in young orchards, as several annual crops can be harvested without interfering with the development of the young orchard trees.

Where the crop is grown commercially it is usually treated as an annual because:—

1. When the plants are grown on for a second year as a biennial crop there are often extensive losses through root rot during the first winter, and affected bushes must be replaced with young plants the following spring, which is expensive and involves a great deal of labour.

2. There is increased danger of infestation of red mite early in the second season through a carry-over of eggs. Severe attacks may devitalise the plants to such an extent that they may never recover fully.

3. Higher yields of better-quality fruit are usually produced on first-year plants.

4. The cost of ploughing over the whole area, preparing it, and replanting is less than that involved in inter-row ploughing, hand hoeing, and weeding of old beds.

The disadvantages mentioned in connection with carrying the crop over for more than a season more than offset, especially on heavier types of land, any advantage gained by the somewhat earlier maturity of fruit from second-year beds.

Cape gooseberries are easily grown and are not expensive to produce. Average production from a good plantation ranges from 30cwt. to 2 tons per acre, although heavier yields have been recorded. Production depends on the length of the harvesting season, which, in turn, is governed by the incidence of heavy autumn frosts and the extent of frost damage.



[Oandâ Studios photo.]

Cape gooseberries in picking boxes.

GROWING CAPE GOOSEBERRIES . . .

Location

The fact that the cape gooseberry is closely related to the tomato and potato is a guide to the soil type and climate necessary for economic production of cape gooseberries. Any district in which dwarf-type tomatoes can be grown successfully should be satisfactory for cape gooseberries, which require a long, warm summer and autumn, fairly abundant rainfall during spring and early summer, and a dry autumn free from damaging early frosts. The spring rains encourage vigorous growth in the plants up to fruit maturity and the dry autumn ensures rapid ripening, so that the maximum amount of fruit is harvested before early frosts destroy the fruit and plants.

Cape gooseberries should be treated as biennials only in areas with a fairly cold winter which will keep the plants dormant until spring. Damage to young shoots by late frosts is thus minimised.

Though, normally, the berries will keep in good condition for a week or 10 days after picking, commercial plantings should be near a town for the following reasons:—

1. To avoid transport delays.
2. To reduce transport costs.
3. The market is in towns.
4. From towns labour for picking is usually available.

Suitable Soil Type

Provided drainage is good and the soil moisture reasonably maintained during the summer, cape gooseberries succeed in a wide range of soil types, from gravelly loams to heavy loams,

but they prefer a sandy loam. A relatively-poor, gravelly soil is suitable, provided there is good spring and early-summer growth up to the time when the fruit is nearly mature. Heavy soils are usually unsuitable because of insufficient drainage and because they are cold, which hampers early growth. Rich loams promote excessive growth, retard fruit ripening, and increase the risk of crop loss through autumn frosts.

An area with a sandy to gravelly loam, not subject to late-spring or severe early-autumn frosts, will be satisfactory for cape gooseberries. Light frosts in the autumn may often be an advantage, as the maturing of the crop is assisted by the slight check to plants and the reduction of the heavier foliage.

Shelter

The foliage of cape gooseberries is tender and liable to be damaged severely by strong winds, both through stem breakage and bruising of leaves. Where shelter is insufficient adequate windbreaks should be provided before the crop is planted.

Preparation of the Soil

Though pre-planting cultivation is not as exacting as that required for permanent small-fruit crops, it should be sufficient to provide adequate drainage, to eliminate as many weeds as possible, and to provide good conditions for the young plants. Before planting is done the fertility of poorer soils should be built up with green crops or rotted stack bottom, and the topsoil should be broken down and levelled to facilitate the marking out of planting positions. On light soils a

light roller may be used, but on heavier soils, where a roller might cause too much consolidation, a clod crusher should be employed.

Propagation

Plants are usually raised from seed each year, and, with normal germination, 1oz. of seed should give from 5000 to 8000 good plants. Seedlings are raised in the same manner as tomato plants, in either of the following ways:—

1. The seed is sown in trays and germinated in a glasshouse or frame, the trays being kept there until the seedlings are big enough to prick out into other boxes. Seedlings are set out in rows 1½ to 2in. apart, with about the same spacing between plants. Seedlings are kept under glass until they are about 6in. high, when they are hardened off in cold frames for 1 or 2 weeks before planting in the field. Plants will be ready to set out in the open about 8 weeks after seed sowing.

2. The seed may be planted in prepared seed-beds outside. Artificial conditions can be obtained by building the seed-bed with about 9 or 10in. of stable manure under a 3 to 4in. layer of fine, fertile sandy soil. The stable manure will heat and give better germination conditions in early spring, while the sandy soil will encourage root development. The whole bed should be protected by placing scrim round the sides and overhead, or it can be covered with a glass frame, which will supplement and store the sun's heat and give better growing conditions.

Seed should be spaced adequately in rows at sowing or the seedlings should be transplanted at the pricking-out stage into another prepared and sheltered bed. Seed should be covered with about ½in. of rich loam, preferably mixed with dry farmyard manure. Moist conditions are necessary for vigorous growth in the seedling stage. From 8 to 10 weeks will elapse between seed sowing and planting out.

Hardening off is achieved by reducing the water supply and shelter gradually so that the plants do not receive a severe check.

Seedlings should be thoroughly soaked before planting out in the field, by applying water to seed boxes if the first method of raising the seed is employed or by watering the seed-bed if the second method is adopted.

Varieties

At present the only variety grown is that known as the common cape gooseberry. Golden Nugget was a variety grown some years ago, but its attributes—large size and heavy crop—were more than offset by its unattractive flavour and few, if any, plantings survive.

An English gardening paper dated 1938 mentions a species *Physalis ixiocarpa*, but it has not yet appeared in New Zealand.

Fruit Quality

Fruit quality can be maintained only by selection of the plants from which seed is to be taken. Early in the



[Candid Studios photo.]

Spring growth of cape gooseberries in an Auckland garden.

growing season several bushes which appear suitable should be chosen and inspected frequently during the season. Those which reveal any undesirable characteristics or are diseased can be rejected. By keeping the fruit from each bush separate until the final selection of plants has been made it will be possible to obtain seed for future crops that can be regarded as carrying the best characters of a particular strain. The possibility of undesirable cross-breeding will be minimised by growing a small area of selected plants especially for seed, isolated from the main fruiting area.

Planting

Field planting should be done in early spring as soon as danger of frosts is past, which depends somewhat on the situation of the garden. Approximate dates are: Auckland, mid-October; Motueka, mid-October to mid-November; and Christchurch, mid-November. Dates for other districts may be based on these.

Planting distances will vary with soil type and other growing conditions and cultivation methods. In general, with mechanical cultivation, the most satisfactory spacing is 6ft. each way (1210 plants per acre), but where ample labour is available for hand cultivation 6ft. spacing between rows and 3ft. or 4ft. between plants is more satisfactory. Where growing conditions are poorer plants may be spaced 3ft. or 4ft. apart in rows 5ft. apart. The 6ft. x 6ft. planting allows the maximum use of horse- or tractor-drawn implements and minimises hand labour.

The field should be marked out at the required distances, using a hand-drawn marker-rake, and the seedlings planted with a trowel on the cross markings.

In the home garden a warm, sheltered spot should be selected in which plants should be spaced 5ft. x 4ft. Normally, 20 plants should yield about 80lb. of fruit—ample for the average family.

Plants Per Acre at Various Spacings

Between rows (ft.)	Between plants (ft.)	Plants per acre
4	3	3630
4	4	2722
5	3	2904
5	4	2178
5	5	1742
6	3	2420
6	4	1815
6	5	1452
6	6	1210
7	3	2074
7	4	1556
7	5	1244
7	6	1037
7	7	889

To ascertain the number of plants per acre, the product of the distance between the rows and the distance between the plants in the rows should be divided into the total area of land to be planted, as illustrated below.

Sq. ft. per acre	43,560	1210
Row width x plant spacing	6 x 6	plants

GROWING CAPE GOOSEBERRIES



[Candid Studios photo.]

A large-model tractor, which straddles a row. Note the apron under the sump, which prevents oil and dirt from damaging the plants.

Cultivation

Cultivation after planting must be shallow, as the feeding roots of the plants are near the surface and cultivation which damages the rooting system will do more harm than good. As the roots spread the width of cultivated strip between the rows must be reduced to avoid damage to the fibrous feeding roots. The garden should be cultivated with a horse grubber or spring-tooth cultivator every week or so until the growth of plants prevents further operations. Where tractor implements are used they should straddle the row, and a strong canvas or sack apron (fitted from the front axle to the differential housing) should be placed under the sump to prevent oil and dirt dropping on the plants and damaging them. (See illustration above.)

An occasional light working of the soil round the plants with a drag fork or torpedo push hoe is essential, particularly in the early part of the season, to keep down weed growth and maintain soil moisture.

After-harvest Cultivation

After-harvest cultivation is usually delayed until the plants are killed by frost. When cape gooseberries are treated as an annual crop it is necessary only to plough the whole area and work the plant refuse into the soil in preparation for the next crop.

When cape gooseberries are treated as biennials, however, after-harvest cultivation is more exacting. At the end of the first season a shallow furrow should be ploughed on to the top of the plants, without first removing the tops. This protects the crowns against winter injury and reduces the incidence of root rot, which is often

caused by moisture entering the hollow ends of stems which have been cut off. The ploughing also diverts the surplus water from round the plant roots to the centre of the rows.

Early the following spring, when growth is commencing and frost danger is past, the area should be ploughed again, "off" the plants. Hand hoeing with a drag fork will then remove the surplus soil and weeds from the tops of the previous season's growth and from around the crown. The previous year's growth will be moved from the crowns into the rows, where it can be incorporated into the soil during the season's operations.

After the second crop plants should be ploughed out and crowns removed and destroyed, as they will be too woody to rot down readily. The season's top growth can be disced in.

Manuring

The object of manuring should be to give a quick start in the spring and to produce moderate growth through the summer and autumn, when it becomes desirable to allow the plants to check quickly in the dry weather to encourage quick ripening and allow the maximum crop to be harvested before autumn frosts occur. To achieve the desired results nitrate of soda or sulphate of ammonia and blood and bone and superphosphate should be applied as a topdressing and worked in round the plants. An additional light dressing of sulphate of potash should improve fruit quality. Rates of dressing will vary considerably with soil type and soil fertility, but the following should prove satisfactory: Sulphate of ammonia or nitrate of soda, 1 part; blood and bone, 2 parts; superphosphate, 3 parts; and sulphate of potash,

GROWING CAPE GOOSEBERRIES



[Oandid Studios photo.]
Inter-row cultivation in a second-year garden with a small tractor. Note the debris from the previous year's growth and the young replacement plants at the bottom left corner of the photograph.

1 part (all by weight). Apply at the rate of 5 to 8cwt. per acre, using about half the quantity before planting or shortly after, so that there is no check to growth when the seedlings are put out in the field, and the remainder as a side dressing 3 or 4 weeks later to maintain steady growth until the fruit nears maturity. After this it is desirable to check growth and hasten ripening.

In the home garden, where soil fertility is usually fairly high, a complete fertiliser should be applied at the rate of 2oz. per plant at planting and a further 2oz. 3 or 4 weeks later.

The manuring programme can be varied by applications of liquid manure.

Lime

Lime is used for soil amelioration rather than as a manure, and there can be no definite recommendation as to the correct amount for cape gooseberries, because it will vary with the acidity of the soil. To determine whether lime will be beneficial or detrimental to a particular crop it is necessary to have the soil tested to determine its pH value—a measure of acidity. (This service is provided free to all growers through the Department of Agriculture.) A pH value of 7.0 denotes a neutral soil, above 7.0 an alkaline soil, and below 7.0 an acid soil. For most cropping, soil with a pH of from 6.0 to 6.5 (slightly acid) is most satisfactory. For cape gooseberries (as for tomatoes) soil with a pH range of 6.0 to 7.0 is usually most satisfactory.

Where soil conditions are slightly acid the beneficial bacteria thrive and produce a maximum amount of available soil nutrients, while the soil itself

may attain a better crumb structure and so is easier to work, drains more freely, and is more thoroughly aerated. If the soil is too acid, the application of lime will correct this fault and provide better growing conditions. When lime is needed it should be applied before sowing a cover crop, or at the latest in the autumn before planting.

Pruning

Little, if any, benefit is derived from pruning cape gooseberries, and it is not a normal commercial practice. Even after harvesting the first crop from plants treated as biennials it is not necessary to remove spent tops. In fact, the removal of the stalks allows winter moisture to enter the hollow stems and may cause additional loss of plants through root rot.

Spraying

The control of diseases and pests by spraying is not standard practice, but the provision of suitable equipment will ensure against loss of crop, as remedial treatment can then be applied before a high incidence of disease or pests debilitates plants and reduces the crop.

On large areas spraying equipment of the row-crop type will be found most suitable; it gives quick, efficient coverage with a minimum of effort. For smaller gardens machines of the 5 h.p. garden-tractor type, with fixed booms, should give adequate coverage, while spraying with hoses from a portable outfit, though harder work, will be found most effective. In the home garden a stirrup pump is suitable for controlling the common infections if the spray is applied in time.

Because of the hairy nature of the plant surface, fairly high pressure and volume are needed to wet the foliage, and spraying is not satisfactory unless it is thorough.

Harvesting

Cape gooseberries ripen in late summer and autumn and harvesting usually commences about 10 or 12 weeks after planting in the field and continues for three months or more, or until frosts in late autumn kill the fruiting shoots. The berries should be harvested when the husks change from green to light brown—the berry also is changing colour at this stage. Frequent pickings should be made to ensure that the fruit reaches the market in the best condition possible. Where a crop is yielding 30 to 40cwt. per acre an average worker will pick up to 1cwt. of berries in an eight-hour day.

Berries must not be packed for transport unless they are thoroughly dry, as damp husks become mouldy and set up fruit rots, beside detracting from the appearance of the fruit. The normal practice is to market cape gooseberries in the 6 x 6 case—the type normally used for stone fruit and tomatoes—which will carry approximately 10lb. of unhusked fruit without damage.

If it is necessary to begin picking before the husks are dry, the berries should be laid out in a single layer on scrim or netting to dry before packing. Where berries are to be sold to a factory for processing it is usual for the grower to husk them. It is tedious work, but it can be simplified by using a long bin made from sacking and having a gradual slope to one end. The cape gooseberries are tipped in at the higher end and the operators, standing on each side of the bin, husk the berries, which are allowed to roll down the slope into a box, thus eliminating further handling. Where husking is done it is usual to husk the previous day's picking of fruit while waiting for the bushes to dry in the morning, as plants are often wet with dew and it is not advisable to pick wet berries. The same procedure will be necessary when wet weather is experienced at harvesting.

Control of Pests and Diseases

Up to the present few economically important pests or diseases have affected the production of cape gooseberries in New Zealand, but the following have been recorded as damaging plants and so reducing crops:—

Red Spider

Red spider is probably the most serious pest affecting cape gooseberries in New Zealand. It may be particularly bad on second-year plants because of early re-infestation from eggs carried over on the previous year's growth; in fact, it may be a limiting factor in treating cape gooseberries as a biennial. In the early part of the growing season periods of dry weather are conducive to the spread of the pest. The spider feeds on the sap, causing a breakdown of cells and general debilitation of the plants. Later, rain and cold weather will check the spider, but where attacks are severe it will be necessary to adopt control measures.

GROWING CAPE GOOSEBERRIES

Control: Spray with 1 per cent. summer (white) oil when red spider is first seen and again 10 to 14 days later to kill any which hatch from eggs at the time of the first spraying. Thorough application with good pressure is required, as the pest is protected by a webbing and is usually located only on the underside of leaves. To make 4 gallons of spray use 6½ fl. oz. of summer oil to 4 gallons of water.

Stem Borers

Stem borers, similar to either the caterpillars of the potato moth or the tomato stem borer, enter the young laterals and destroy them.

Control: Where infestation is likely to be serious the crop should be sprayed periodically from the time it is about 12in. high with D.D.T. (2lb. of 25 per cent. wettable powder to 100 gallons of water—1 1/3oz. of 25 per cent. wettable D.D.T. powder to 4 gallons of water) or with arsenate of lead powder (3lb. to 100 gallons of water—2oz. to 4 gallons of water).

Cutworms

As with tobacco and tomato crops, cutworms can cause serious loss in cape gooseberries by destroying the young plants. "Cutworm" is a general term applied to the night-feeding caterpillars of a number of night-flying moths. Cutworms eat through the stalk at ground level and devour the foliage when the plant falls over. The caterpillars are active throughout the growing period, but most damage is done to young and tender plants at the time of establishment. During the day the caterpillars may be found curled up just under the surface of the soil at the base of plants they are attacking.

Control: Where cutworms are troublesome it is advisable to broadcast poisoned bran before planting. Mix thoroughly 1lb. of the poison Paris green or 2lb. of arsenate of lead with a bushel of dry bran (about 50lb.). A suitable quantity for the home garden is 4oz. of Paris green or 8oz. of arsenate of lead to 12½lb. of bran. Moisten the bait with water, sweetened with molasses, so that the mixture reaches a crumbly, but not saturated, condition. The bait should be broadcast in the early evening at the rate of a bushel per acre, and applications should be continued after the plants have been set out and until they have become sufficiently woody to withstand attacks. It will be necessary to repeat applications after rain. In home gardens bait may be broadcast over the area or applied separately to each plant.

As a further control measure growers should remove any dense weed growth which may provide a breeding ground for cutworms.

Thrips

Thrips do not usually cause extensive damage, but where attacks are severe plants may be seriously devitalised, with consequent reduction of crop.

Control: Spray with 40 per cent. nicotine sulphate 1:600 plus 1 per cent. summer (white) oil soon after the first signs of damage appear and repeat 10 days later. To make 100 gallons



[Candid Studios photo.]
Spraying with a boom-type, row-crop sprayer. Three rows are sprayed adequately at the same time.

of spray add 1 pint 7 fl. oz. of nicotine sulphate and 1 gallon of summer oil to 100 gallons of water; to prepare 4 gallons of spray use slightly more than 1 fl. oz. of nicotine sulphate and 6½ fl. oz. of summer oil.

Root Rot

Root rot is a physiological trouble produced through excess water breaking down underground plant tissues. In most cases it leads to the death of the plant and it causes considerable loss in gardens where the water-table is high and drainage poor. In the heavier soils, where this trouble is most serious, it is usually practicable to grow cape gooseberries only as an annual crop.

Control: There is no control for root rot, but the incidence of the disease may be reduced by improving drainage. Where cape gooseberries are grown as biennials plants affected by root rot may be replaced by seedlings during the following spring if the incidence of the disease is low.

Collar Rot (*Sclerotinia sclerotiorum*)

Collar rot is a fungus disease which attacks many plants, including the tomato, potato, and ornamentals such as the chrysanthemum and antirrhinum. It occurs usually at ground level and appears as straw-coloured areas several inches long. When the main stem of affected cape gooseberries is cut lengthwise the pith cavity will often be found to contain fluffy white mycelium, which later gives way to black, sausage-shaped bodies (sclerotia), the form in which the fungus rests during droughts or through the winter. The next spring re-infection occurs when the resting bodies fruit and discharge spores into

the air. Usually the fungus attacks plants after injury has permitted easy access of the spores. Collar rot is usually more prevalent in gardens with poor drainage.

Control: In the field there are no control measures other than the removal and destruction of affected plants. By leaving the hole from which the plant has been removed open to the weather the spread of the fungus may be retarded. Improvement of soil conditions for future plantings may also assist control.

Virus Diseases

Cape gooseberries are susceptible to tobacco mosaic, but to date this has not caused serious losses in the field. Symptoms are mottling, with or without distortion of the leaf blade, and sometimes this may be accompanied by some necrosis (brown spots of dead leaf tissue).

Control: Affected plants should be removed when observed early in the season so that the risk of spread will be minimised.

Cape gooseberry growers should consult the Orchard Instructor for the district about the identification of diseases and the necessary control measures.

Acknowledgments

The assistance of Officers of the Plant Diseases Division, Department of Scientific and Industrial Research, Auckland, in reviewing the section dealing with diseases and pests is acknowledged.

References

- "Standard Encyclopedia of Horticulture"—Bailey (1).
- "Garden Pests in New Zealand"—Miller.

SMALL GLASSHOUSE HEATED FROM A BOILING POOL



PHENOMENAL GROWTH FROM USE OF ROTORUA'S NATURAL HEAT

By C. R. TAYLOR, Fields Instructor, Department of
Agriculture, Rotorua.

THE desirability of utilising the natural heat available at such places as Rotorua for the generation of power and the production of out-of-season fruit and vegetables so much in demand by the consuming public has been widely discussed for very many years. So far, however, little of a practical nature has resulted from the many and varied suggestions that have been made, though research into the problem is taking place and many private homes are at present being efficiently heated by thermal heat.

THE use made of natural heat by Mr. H. C. Smith, of Ohinemutu, Rotorua, as shown in the accompanying illustrations, demonstrates what can be done, and there is no doubt scope for a much greater use of natural heat for raising early produce. For instance, an extensive and important glasshouse industry has been developed in the thermal regions of Iceland, where out-of-season fruits and vegetables are grown for export, despite the otherwise unsuitable natural conditions. Development could logically take place along similar lines in the thermal regions of New Zealand in places where fertile, well-drained soils are in the immediate vicinity of hot springs and where there is also a sufficient supply of local labour to meet the seasonal needs of growers and adequate transport facilities for carrying crops to markets.

Glasshouse Efficiently Heated

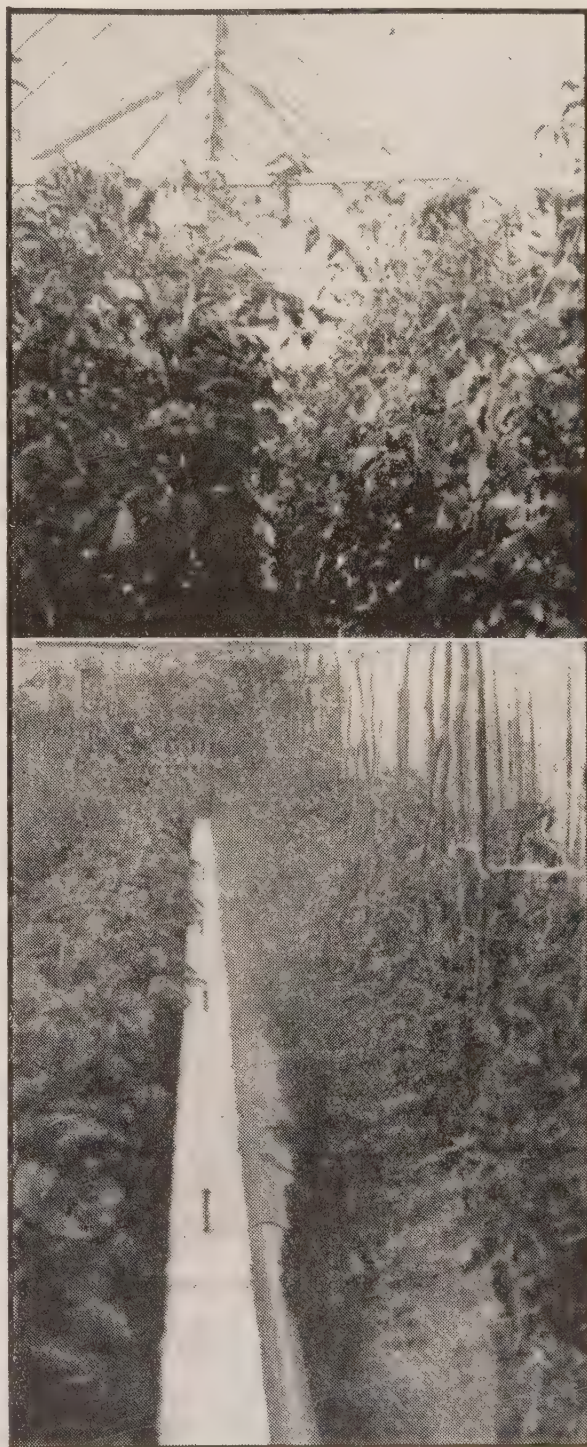
A small glasshouse efficiently heated from a nearby boiling pool at very little initial cost and practically no running expenditure is illustrated on the opposite page. The glass frames outside, which are also thermally heated, are chiefly used for raising seedlings. The tomatoes seen through the open door were nearly 7ft. high and laden with full trusses of fruit when the photograph was taken at the end of November. Normally tomatoes would barely be established in the open ground at this time of the year in Rotorua. The vigour of the healthy vines is evident in the upper illustration on this page.

To prevent corrosion of pipes by the sulphurous spring water of the boiling pool from which heat for the glasshouse is obtained, town supply water is taken down through a coiled copper pipe immersed in the boiling spring and then led away to the glasshouse. Thus a very simple, effective, and cheap method of heating is obtained. The glasshouse is only about a chain from the boiling pool (see illustration at bottom of opposite page), so that piping was not expensive.

Cucumbers were growing strongly and fruit was developing fast in the seedling frame shown on the opposite page when the photograph was taken at the end of November. A hot water pipe runs along the back of frames in the glasshouse.

Part of the foundations of a much larger glasshouse in course of erection is shown in the lower illustration on this page. When the photograph was taken at the end of November hot thermal water from a very small spring close to the large one was being discharged from a 3in. pipe into an open drain leading to a stream at the back.

The phenomenal growth of outdoor tomatoes, which are in flower and fruiting, is indicative of the influence of the hot water and steam in raising the soil and air temperature well above the minimum required for vigorous plant growth.



Arsenic Poisoning of Cattle

By E. H. STEPHENS, Veterinarian, Department of Agriculture, Stratford.

CASES of arsenic poisoning of cattle in New Zealand arise mainly from the use of arsenic weedkillers and dips, as the arsenic used in them has to be in a very soluble form if they are to be effective, and is thus readily and rapidly absorbed into the animal's system. Absorption can also take place through the skin if arsenical pastes are used to treat warts and skin infections.

FORTUNATELY, New Zealand has not the additional source of poisoning risk common in other countries, where the fumes of smelters poison streams and contaminate and even destroy vegetation. The incorporation of salts of arsenic in condition powders and similar remedies, which was once common, is now restrained by the poison regulations, and less toxic and more efficient substances have replaced the arsenic in worm remedies. Even the present risk of arsenic poisoning from weedkillers and dips, the symptoms and first-aid treatment of which are dealt with in this article, is likely to decrease with the increasing use of substances like "Gammexane."

Symptoms

Symptoms of arsenic poisoning depend on the amount and solubility of the form of arsenic responsible. If large amounts in a highly-soluble form are taken by the mouth, the animal may be found dead before symptoms are observed. Under other circumstances, as soon as the poison has passed the first three stomach compartments symptoms of abdominal pain appear, the animal kicking at its belly and manifesting uneasiness. Thirst and scouring are evident. If more than a small amount has been absorbed, the animal goes down and may remain down for up to 5 or 6 days before it dies, the period depending on the amount and availability of the poison in the system.

When arsenic paste has been applied to the skin to remove warts or to treat skin affections the surrounding area swells and, if infiltration of the tissue has been extensive, sloughs are shed. The sloughing action of arsenic may be delayed and may extend beyond the area of immediate application. This action is well illustrated when arsenic has been applied to a pendulous organ like a teat, as has been done in the treatment of "black pock." Some time after the teat drops off. This is probably because the absorbed arsenic destroys the blood vessels supplying the part and local death of the tissues thus ensues, followed by sloughing.

First-aid Treatment

As soon as possible a pint of liquid paraffin should be given to affected animals. The following prescription made up by a chemist should then be given:—

Solution of iron perchloride (3 parts) in water (17 parts).

Calcined magnesia (1 part) in water (17 parts).

Mix half a pint of the magnesia solution with half a pint of the iron solution and give this drench to each affected animal. In bad cases repeat in a few hours; in mild cases repeat the next day. In all cases where improvement is shown treatment should not be stopped at once, as more unneutralised arsenic may still be in the process of release from the rumen. Veterinary assistance should be obtained where possible. Speed is the prime necessity in the treatment. The calcined magnesia, though not an antidote to arsenic, is valuable in relieving the very severe gastric pain.

Case Reports

The following descriptions of cases of arsenic poisoning may assist farmers in the prevention and diagnosis of the trouble:—

About a dozen cows had been dressed for ringworm with a paste dip. Forty-eight hours later one cow was dead (she had probably died 24 hours after the application of the dip) and the other animals were badly swollen and inflamed around the dressed areas. The dip used was in an old, unlabelled container of unknown origin, and as examination of the affected animals suggested that they had been dressed with an arsenic and carbolic preparation, treatment for both arsenic and carbolic poisoning was successfully applied. The toxicologist reported both arsenic and carbolic present in the organs of the dead cow. In these cases the cows' licking of the dressed areas added to the arsenic absorbed from the skin.

On a farm where blackberry and ragwort on the creek banks had been sprayed with an arsenical weedkiller there was much coarse grass around the base of the weeds from which it would require very heavy and prolonged rains to wash the arsenic salt or to reduce it to a harmless amount. When two cows on the property were badly affected with apparent poisoning and three or four others more mildly the owner was unwilling to believe that arsenic was responsible, as it had been his practice to spray with arsenical weedkiller for the last four years. When treatment for arsenic poisoning showed success it was revealed that when symptoms of poisoning were first observed and the herd had been lifted from the paddock they were grazing, one cow which had been considered dead had been left. This animal was found to be still alive, but treatment proved unavailing. All except one of

the affected animals were 3-year-olds recently bought from the back country who had evidently found the tufts of roughage round the base of the sprayed weeds more alluring as feed than had the regularly well-fed cows of the herd.

There is sometimes a tendency in poisoning cases to withhold vital information until too late, which makes the task of the investigator more difficult. Every disease and poison has not a set of distinctive symptoms to render identification easy and certain, nor is there a single antidote for all poisons. Therefore, though poisoning cases can be readily assigned to their particular class, such as corrosive poisons, mineral poisons, etc., the identification of the actual substance involved may be very difficult. It should be remembered also that a toxicological examination is an expensive and prolonged process, and results are rarely available in time for use in the actual incident which provided the material. The following cases illustrate these points:—

The only reputed grazing of three cows which were down was free of any suggestion of poisonous plant either in sward or hedgerow. Symptoms suggested a mineral poisoning. Inquiry if the animals had had access to any area where weedkiller had been used was answered by their owner in the negative. The only apparent source of a mineral poison was a newly-painted concrete wall and gateway. The animals were treated for lead poisoning, though the symptoms were not very typical. All three cows died. Toxicological report on the organs revealed arsenic. Some years after information was vouchsafed that the animals had been turned into a paddock where a weedkiller had been used. If this information had been available at the first visit, one cow certainly, and probably two, could have been saved. The remaining cow was too far gone to save when first seen.

On a farm of about 12 acres three cows showed symptoms of arsenic poisoning, one being very badly affected, one badly, and the other slightly. As the owner denied the use of weedkiller and nothing suggested the contrary, practically the entire farm being in view, treatment was confined to the symptoms exhibited. When the farm was visited two days later it was then revealed that the far side of a block of Californian thistle had been sprayed with arsenical weedkiller, and examination showed that many of the dead flower heads on the sprayed plants had been eaten by the cattle. The worst-affected cow was already dead, but treatment for arsenic poisoning saved the slightly-affected one. Examination of specimens of the sprayed flower heads by a toxicologist revealed that a toxic dose of arsenic for a cow was contained in 1lb. of the heads. The paddock had been left empty for 11 days after spraying and rain had fallen, but obviously the arsenic in the downy material of the flower heads would have been largely protected from rain. In this case, though one cow was too far gone when first seen for any antidote to be successful, early notification of the use of weedkiller would probably have saved another.

THE EAST AFRICAN GROUND-NUT PROJECT

Development on Vast Scale to
Relieve Britain's Fat Shortage

PERHAPS the most important deficiency in the present-day diet of the people of Britain is that of oils and fats. New Zealand and other parts of the Empire are doing their utmost to alleviate the position, but even their best efforts cannot bring a complete and permanent solution to the problem. Something more is needed, and the United Kingdom Government has taken a bold and far-reaching step by launching the development of the ground-nut industry in vast, hitherto-undeveloped areas of East Africa. This article is adapted from a paper read to the first conference of the British Society of Soil Science, held in Oxford, England, in September of last year, by A. J. Wakefield, who was a member of a mission sent to East Africa to draw up a report on the possibilities of the project.

BITAIN has neither sufficient land nor manpower to feed herself, and no longer can the greater part of the food which must be imported be obtained from North America. The shortage of fat is probably the most serious and intractable part of the food position in Britain. The Ministry of Food can see no solution to it, in this generation at least, unless some great new source of production is developed. The present world shortage—on the basis of pre-war figures, and taking no account of the increase in population and the demands of masses in Asia and Africa for better food—amounts to about 2,000,000 tons of fat; that is equivalent to some 5,000,000 tons of ground-nuts, or more of other oil-seeds.

The fat deficiency became a matter of concern when the British housewife was up in arms early in 1946 against a cut of ½oz. of fat a week. No doubt that explains the urgency with which the ground-nut project has been undertaken, and the tremendous motive power behind it.

History of Project

When Mr. Samuel, managing director of the United Africa Company, an associate of the Lever Group which has extensive palm-oil interests in West and Central Africa, was in Tanganyika early in 1946, he considered the possibility of a small development, if the company could obtain suitable land, for the mechanical cultivation of ground-nuts. On his return to England he was immediately faced with the realisation of the critical long-term situation in oils and fats that could, it was apparent, be rectified only by rapid and large increases of annual seed crops. Mr. Samuel therefore abandoned the idea of the small development by the company and proposed a very large-scale development by the Government.

His proposals for mechanisation arose from the obvious fact that it would be useless to expect the 60,000,000 people of tropical Africa to replace the efforts of 360,000,000 Indians. In any case, it is now accepted that the hand hoe and primitive methods of subsistence agriculture that have prevailed in Africa since biblical times cannot give more than a miserable existence to the African tribes alone, and are in fact doomed.

The scheme was immediately approved by Cabinet, and a mission was sent to East Africa in June, 1946, returning three months later. It considered the Samuel scheme practicable and submitted a report to the Government in September. Cabinet approved it in principle before the end of the following month. A special section of the Ministry of Food was immediately set up and perused the scheme throughout November and December, consulting



African labourers waiting in the shade to draw their daily food ration at one of the camps.

numerous authorities on the major technical, financial, and sociological points involved. It concluded that the scheme was soundly based and that the food needs of Britain demanded its immediate application.

Urgent Action Taken

Neither the tremendous difficulties nor the risks involved were overlooked. It was accepted that here and there mistakes would be made, but there was no doubt that, given a good scientific service, many of the technical problems could be anticipated and ultimately all should be overcome.

Urgency was the keynote; the usual series of experimental and pilot projects could not be awaited. It had to be all or nothing. So, before the end of the year, Cabinet approved the whole scheme, which was estimated to cost about £23,000,000, involving the construction of a new port and railway at an additional cost of £2,250,000.

The Government decided that the project should be operated by a public corporation, financed entirely by the British Treasury. To this end the Overseas Food Corporation will shortly be established by statute. Provision has been made by the United Kingdom Government for the undertaking to be transferred to the local Governments when desirable as a step toward the long-term aim of bringing African people in on a co-operative basis.

The urgency was so great that the project could not even await the enactment of the necessary legislation to establish the corporation. The United Africa Company was therefore invited to become managing agents to the Minister of Food so that operations might start forthwith, and in December, 1946, the company agreed to undertake this great responsibility. It is taking no remuneration for it—indeed, the cost to it can hardly be calculated. Not only the United Africa Company but the whole weight of the world-wide Unilever organisation has been put to the service of the scheme.

The managing agency has drawn on the personnel of its plantations in Africa for the ground-nut scheme. It sent out an advance party in January, and in September had 175 Europeans on the job in Tanganyika and the same number engaged by contractors for bush clearing and erection of installations; 4700 Africans had been engaged. A branch railway has already been built by the Tanganyika Government. Surveys for the new port and railway to serve the main area of 1,750,000 acres in the Southern Province have been completed, and construction will proceed almost immediately. All that has been done in less than a year after the mission's report was handed to the Secretary of State for the Colonies.

AFRICAN GROUND-NUT SCHEME . . .

There have been other developments of great importance to both Britain and Africa. The ground-nut scheme has been extended into the Overseas Food Corporation, which has a capital of £50,000,000 and can undertake projects for food production almost anywhere overseas. That was followed quickly by the formation of the Colonial Development Corporation.

Importance to Future of Africa

Important as the project is to Britain, what is most satisfactory is that Britain's present needs provide the opportunity of placing the African colonies on their feet. Until the Samuel scheme was evolved, it seemed that East Africa was on the verge of complete economic and social breakdown; even now only the production of the European farms in Kenya is staving off famine. The East African native population is not in a position to make any substantial contribution to world food supplies. It is to be found mostly where water supplies are present. Soils are impoverished by the primitive methods of peasant agriculture, and erosion and land ruination are inevitable as such penned-in populations increase. The position is made worse as the incidence of disease and the death-rate are lessened by the health services. Political unrest develops as education proceeds without improvement in the standards of living.

Tanganyika, for example, has 1,500,000 people in Lake Province, which until 1940 produced appreciable quantities of cotton, ground-nuts, and cereals for export; now they can barely feed themselves and the Tanganyika Government is embarking on a resettlement scheme costing £750,000. Kavirondo Province of Kenya was previously a great maize-growing area; the soil is now beggared out. An appreciable part of the Ukamba Reserve in Kenya is already ruined. All told, the East African Governments are faced with the problem of resettling more than a million people. They must also set about the rehabilitation of a million acres and more of impoverished land. Resettlement on an individual basis, however, is likely to result in a repetition of the process of land ruination. The fact must be faced that East Africa is approaching a condition of chronic famine.

Limitations of Mixed Farming

Mixed farming on the basis of animal husbandry has been held to be the cure for the ills of African peasant agriculture, but as long as the cow has to depend for its food on the produce from the land on which it is kept, its manure cannot add to the fertility of that land. Animals are a good medium for getting the farmer to return all crop residues to the land, but that is not enough if the productivity of heavily-populated land is to be increased to feed the people and to provide a surplus for sale off the farm. It seems that the selling or consuming of meat and milk off the farm, without bringing on to it at least an equivalent amount of plant and animal nutrient in the form of fertilisers or feeding stuffs from outside the farm, must finally impoverish the soil. The end can be but little different from that of continuous cropping with maize or even with such leguminous crops as ground-nuts and pulses.

It is said that one of the principal aims of colonial departments of agriculture is to determine a rotation of crops that not only will maintain but also will improve soil fertility, but is it possible merely to ring the changes and export from the farm or consume locally a succession of different crops, whether legumes or not, without replenishing the soil? In one colony, in a densely-populated maize-producing province, maize is regarded as a soil-destroying crop, and an alternative food crop is being sought which will not have this effect. Can they ever find a crop which will provide a satisfactory number of calories per acre without putting back the minerals which are removed by the crop? Of course, the role of humus and the great importance of soil structure must not be underestimated, but a crumb structure cannot be produced in the light soils of a great part of Tanganyika.

In addition to the so-far insoluble problem of soil impoverishment under conditions of primitive peasant agriculture is the difficulty of providing more land for the overflow of the people from the overpopulated areas adjoining Lake Victoria. That may be difficult to understand when the density of the population in Tanganyika is only

14 per square mile. It is true that thousands of square miles of unused yet cultivable land with reasonable rainfall have no population at all, but it is covered with heavy bush and trees. The African with his home-made axe, hand hoe, and fire cannot clear more than an acre or so of it in any one year. He crops this until the soil is exhausted and then moves on. For the most part such land is waterless, and in many areas the women have to travel several hours each day to fetch a gourd of water for drinking purposes; they cannot afford to put down boreholes or to build reservoirs.

Also there is tsetse over five-sixths of Tanganyika, so that the African cannot use ox-drawn implements. Under such conditions it is either the hoe or the tractor. The African cannot afford a tractor, and the Tanganyika Government has said that large-scale clearing of the tsetse-infested Miombo bush is possible only by the bulldozer, but that is uneconomic.

In short, African agriculture is still as it was a thousand years ago, except that cash needs for the payment of tax, the purchase of clothes, and the provision of administrative, technical, and social services from abroad have been added to the old tribal subsistence economy. The condition has been one of stagnation because the line has been taken that the necessary ameliorative measures of implements, fertilisers, and water cannot be afforded.

Now the soil of Africa can no longer carry the burden by itself. Even if the economy of East Africa only is considered, and production for the world market is ignored, the point has been reached where it is not what Africa can afford to have but what she cannot afford to do without. Again, on the economy of East Africa alone the cost of solving the problem would be an impossible burden to place on the British taxpayer.

The ground-nut scheme entirely alters the position. The directors of the project are in no doubt that science must be fully harnessed to the scheme to ensure its success. In the near future advisory panels of eminent authorities in Britain on agriculture, education, sociology, and medicine will be established to advise them. The agricultural panel will cover soil chemistry, agronomy, nutrition, plant pathology, entomology, economics, statistics, and mechanisation.

Laying out of Land

The 3,250,000 acres involved will be laid out in units of 30,000 acres each on a soil- and water-conservation basis. Contour cultivation and strip cropping will be used. In the first instance a simple rotation of half ground-nuts and half grass will be followed; whether this will be on a basis of two years or only one of ground-nuts has yet to be decided. It is hoped to replace grass with dwarf sorghums, which can be combined with sunflower.

To start with, 4cwt. of lime per acre will be applied where tests indicate that to be necessary, and 1cwt. of superphosphate and ½cwt. of sulphate of ammonia will be applied directly to the ground-nuts. A large number of fertiliser experiments is now being laid down, and it is hoped that smaller dressings will be effective. The utilisation of local phosphate deposits and the local manufacture of calcined phosphate are also being planned. If successful, this should provide a considerable saving in the fertiliser bill, which for next year's planting of 500,000 acres will be more than £1,000,000.

Pests and disease have received special attention. Considerable quantities of ground-nuts are planted on the springbok flats of South Africa in fields of up to 300 and 400 acres, sometimes for several years in succession. Rosette disease (transmitted by an aphid fly), sclerotium, and wilt disease are not the danger they were a few years ago. Rosette disease is controlled by close planting within the row to enable the predator ladybird to move freely from plant to plant in search of the aphid. Wide spacing is then permissible between the rows, and is necessary for mechanical cultivation. Previously in East Africa it had been thought that close planting both within and between the rows and the absence of clean weeding were necessary to produce a humid micro-climate which was considered to be inimical to the aphid vector.

At the same time negotiations are proceeding with a commercial concern already operating in the Sudan and Southern Rhodesia to provide what is regarded as a "fire brigade" service to deal with sporadic outbreaks.

A Serviceable Farm-made Roller

By E. H. ARNOLD, Instructor in
Agriculture, Department of
Agriculture, Whangarei.

IN many districts poor strikes of pasture and crops are due to lack of consolidation. Though suitable consolidation can be achieved by including a long summer fallow with shallow final workings in the preparatory cultivation period, or by tramping the seed-bed thoroughly with sheep, it is more usual to employ the roller, particularly the Cambridge roller, to get consolidation. In many districts farmers do not possess Cambridge rollers, but Mr. G. P. Adamson, who has a property on the light, sandy loam soil at Taipa, near Mangonui, has demonstrated that a serviceable roller can be built on the farm.

MR. ADAMSON'S roller consists basically of two 44-gallon drums filled with concrete. Each drum revolves on an independent 1in. steel axle working inside a pipe bearing which runs through the axis of the drum. A grease nipple on the end of the drum through the concrete ballast and welded into the pipe axle bearing in the centre of the drum provides the means for lubricating each axle. The grease is deposited on the centre of the axle and works out toward either end. The lubrication system is set up in each drum before the concrete ballast is poured in.

The rear end of the drawbar is fitted with a central plate of $\frac{1}{4}$ in. steel, 4in. wide and 20in. long. The plate works between the two drums, which are 2in. apart. The independent drum axles are fitted to the plate so that one axle is $1\frac{1}{2}$ in. ahead of the other (see diagram). This difference permits some independent movement for each half of the roller so that it can ride over uneven patches without one half being lifted clear of the ground. The inner end of the axle fitting into the round

hole A is worked to a mushroom head. The inner end of the other axle fitting into slot B is constructed so that a quarter turn will hold it in place (see diagram).

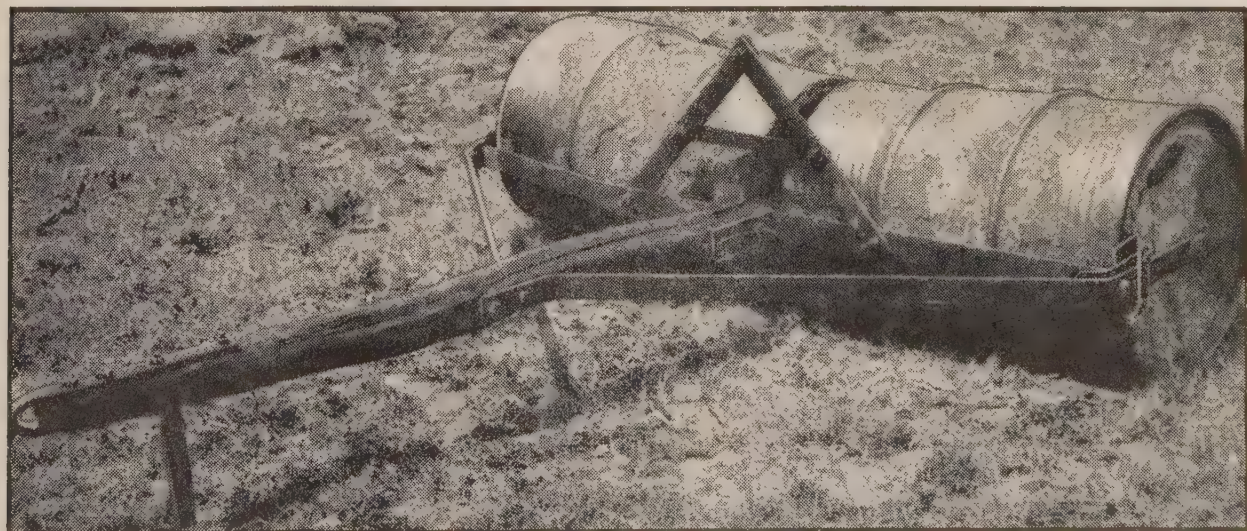
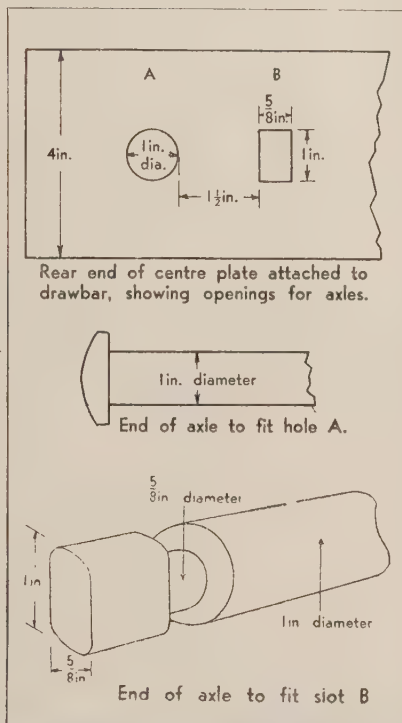
Assembly Procedure

When the two roller sections are being fitted to the frame the drum and the axle passing through the hole A should be put together first. The axle is passed through the hole A and then through the drum and the corresponding holes in the outside frame piece. There it is locked by a cotter pin placed between the double-backed end of the frame piece and a hole drilled through the axle. Next the second drum is placed in position and its axle inserted from the outside, passing through the double-backed frame piece, the drum, and then slot B. The axle is then given a quarter turn and locked at the frame piece with a cotter pin.

The frame of the roller has been made from odd pieces of steel. The important feature of the roller is that it retains its rigidity, the triangular construction over the crossbar in front of the roller sections assisting materially in this connection.

The centre plate at the rear of the drawbar is fitted into a slot in the wooden portion and pivots on the large bolt. The two portions of the crossbar of the frame are bolted rigidly to the drawbar. Four wearing plates (one can be seen to the right of the roller in the illustration on this page) are provided where the drums are likely to contact the frames.

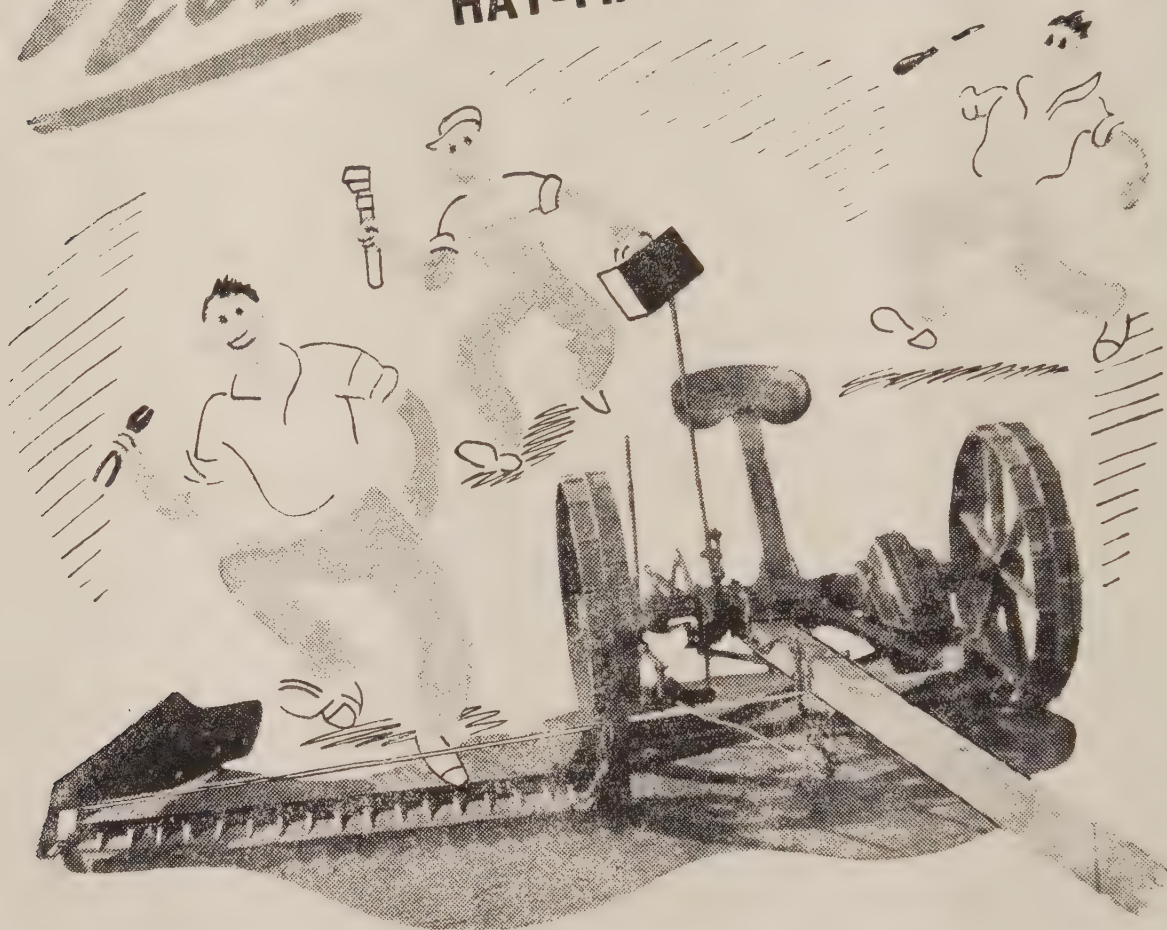
An improvement in construction suggested by use of the roller would be larger axles— $1\frac{1}{4}$ in. or even $1\frac{1}{2}$ in. diameter. Nevertheless, this efficient and cheaply-constructed roller has proved exceedingly valuable to Mr. Adamson.



The roller built by Mr. Adamson for use on his property at Taipa.

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FOUL-BROOD OF BEES AND ITS CONTROL

By I. W. FORSTER, Apiary
Instructor, Department of
Agriculture, Invercargill.

THE honey bee, though it lives and rears its young in one of the tightest-packed communities in the animal kingdom, is susceptible to very few really serious diseases. This is because of its rigid system of cleanliness and hygiene and also because its main food, honey, has prophylactic qualities and is free from bacterial activity. The most serious bee disease in New Zealand is American foul-brood (*Bacillus larvae*), with the characteristics of which most beekeepers are familiar, but because of the need for constant vigilance a review of the symptoms and methods of control are given in this article.

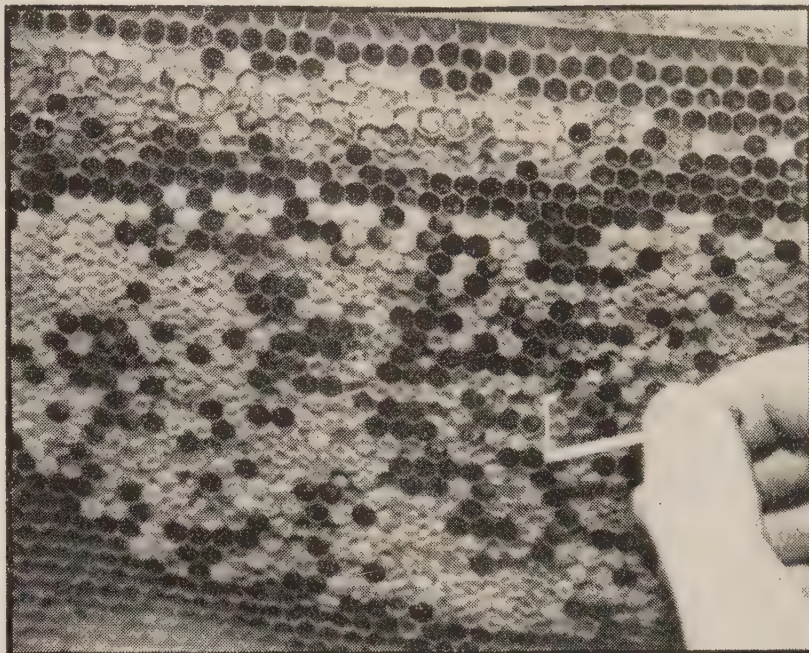
AERICAN foul-brood has no host other than the brood of the honey bee and cannot affect humans or animals.

The causal agent of American foul-brood is a microscopic organism *Bacillus larvae*, which is regarded as a very low order of vegetable life. This bacterium is spore forming; that is, it has two forms of existence, the resting or spore stage, when it can be likened to the seed of a plant, and the vegetative, or active stage, when it multiplies rapidly.

The disease is transmitted to the brood in the larval food. It is then in the spore stage, having been picked up by the nurse bee either in honey or by her contacting other contaminated material. In the digestive tract of the larvae the bacteria change to their vegetative form and multiply rapidly. It is at this stage that the disease is fairly vulnerable and most easily destroyed. The growth of the bacteria rapidly destroys the stomach tissues of the unborn bee and finally kills it by causing the collapse of the alimentary canal.

Death usually occurs in the late larval or early pupal stage, just after the cell has been capped over by the bees. In rare cases, however, some unsealed larvae may be destroyed, usually when the disease is well advanced.

The bacillus, after the destruction of its host, reforms into the spore stage, in which condition it will remain inactive until it is passed on to a fresh victim. These spores will survive for an indefinite period and are most difficult to destroy. They are impervious to disinfectants and can even survive boiling temperature for some time, though half an hour of such treatment is usually effective, provided the boiling water has actual contact with the spore.



[Sparrow Industrial Pictures Ltd. photo.]

A frame of brood affected by American foul-brood disease. The way the decaying matter clings to the probe and ropes out in a glistening brown thread when the probe is withdrawn is characteristic of affected brood.

Effect on Brood

When infected larvae die they collapse against the lower cell wall and slump down with the tail turned a little way up the cell base.

The decaying mass is at first creamy brown and of a slimy consistency. In time it darkens almost to black and dries out through various stages of viscosity to become finally a hard scale adhering tightly to the lower cell wall. This residue lies quite flat except that the lower end turns up slightly to give the scale a ski-like shape.

If the pupae stage is reached before death occurs, the dead brood may hold some semblance of shape for a short time, but soon collapses and follows through the same process of decomposition as dead larvae. When brood in the pupae stage is killed by foul-brood the tongue is thrust out and often adheres by its distal end to the upper cell wall, where it will sometimes remain like a thread across the cell mouth for a considerable time.

Foul-brood at times has a characteristic gluepot-like smell, but as this is only occasionally easily discernible, the absence of this typical odour carries no weight in the diagnosis of foul-brood.

Healthy Brood

Normal brood as in the illustration on page 391 has convex cappings which, though varying in colour from very light to very dark brown, have a bloom and freshness that indicate

to the experienced beekeeper the healthy condition of the brood.

If the cappings of some of these healthy cells are removed, there will be revealed, according to the age of the occupant, the pearly whiteness of larvae, the dead white of newly-formed pupae, the pinky eyes and yellowing body of advanced pupae, or the darker yellows, browns, and blacks of a young bee nearing maturity.

Symptoms of Foul-brood

The death of a larva or pupa within its cell affects the appearance of the capping, and it is this that indicates to the beekeeper that all is not well. The cappings of foul-brood-infected cells become darkened and greasy looking. They flatten in shape and later become sunken, as in the illustration at the top of this page. The bees often make perforations and at times remove the capping altogether. Some strains of blacks and hybrids put on an extra heavy capping in an endeavour to seal off the disease.

Any apparent irregularity in the brood of a hive should be immediately investigated. If scrutiny of a suspicious cell indicates conditions suggestive of disease, a further test can be made by inserting a splinter of wood into the cell and endeavouring to lift the contents. If it is a case of American foul-brood, the main body of decaying matter will remain adhering to the cell wall, while a portion will cling to the probe and rope out in a glistening brown thread as in the illustration.

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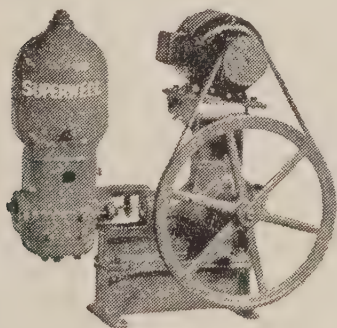
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FOUL-BROOD DISEASE OF BEES

The ropy condition is not always as pronounced as in the illustration, but this characteristic, even if less pronounced, is usually quite distinct. If the dead brood is in an advanced stage of decomposition, it may be past the ropy stage. In hot, dry climates this condition may persist for only a short time. If the layer of matter on the lower cell wall is lying flat, however, and none of it will lift out, the worst can be expected.

In any case, if suspicious symptoms are discerned, the Apiary Instructor for the district should be communicated with immediately.

Spread of Infection

Spores of American foul-brood are transmitted by contact. The inevitable rapid spread of infection within the hive once the disease has gained admittance is obvious from even a cursory study of the closely-linked community life of the bee. Even though only an odd cell of the disease has appeared in a hive, it is not long before all of the bees and the equipment and honey of that hive are contaminated. In a short time all brood the bees attempt to rear will be attacked by the disease and the colony will rapidly succumb.

The spread of foul-brood from hive to hive and from apiary to apiary is caused by:—

1. The use of contaminated appliances

No second-hand apiary equipment or appliances should be used unless their previous history is known or they have been thoroughly sterilised. The Apiaries Act does not allow such articles to be transferred from one location to another without a permit, and it is in the interest of all to see that this provision is strictly carried out.

When disease is found in a hive the hive tool, the smoker, and the hands should be thoroughly cleaned before proceeding to work with other colonies.

2. Acquisition of diseased honey by robber bees

Foraging bees range over a wide area and any infected honey within a 2-mile radius constitutes a potential danger. There is little the beekeeper with clean hives can do about this except to avoid starting his own bees robbing, which may extend to other hives in the neighbourhood.

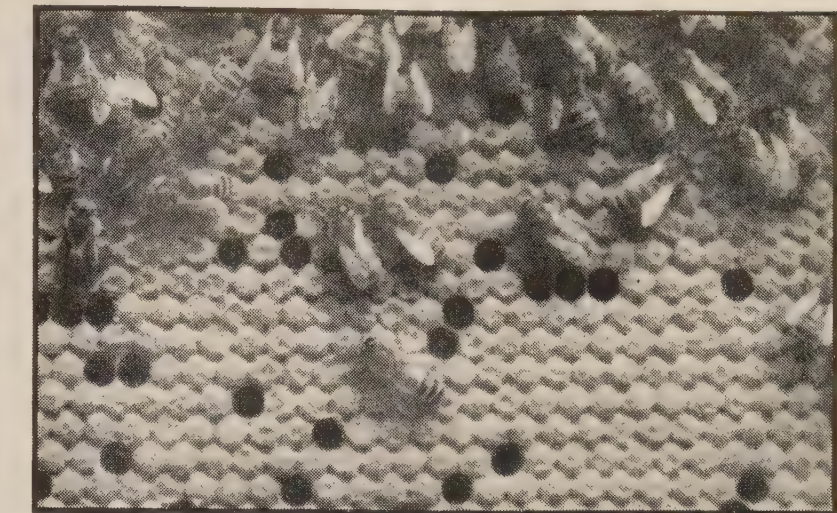
The Apiaries Act makes it illegal to expose diseased honey, and though it is unlikely that anyone would do so deliberately, great care should be taken to avoid its happening inadvertently. Diseased hives should be dealt with promptly so that there is no danger of their being robbed out in their weakened condition or through being accidentally overturned.

3. Feeding of diseased honey to bees

Honey from an unknown source should never be fed to bees.

4. Drifting of bees from hive to hive

As a certain amount of drifting takes place within apiaries, beekeepers should always be suspicious of those colonies in the immediate vicinity of a diseased hive or in the same position in other rows. Bees in a diseased hive



The convex cappings of normal brood, varying from very light to very dark brown, have a bloom and freshness that indicate the healthy condition of the brood.

should not be confused or disorganised nor any attempt made to deal with the hive while the bees are flying.

5. Hiving of infected swarms

All stray swarms should be treated as suspect and held in an empty box for three days before they are transferred to a permanent hive, and any comb they may have built during that period should be destroyed. They and any equipment used with them should be segregated until they have proved themselves free from infection.

6. The acquisition of bees and queens from diseased apiaries

Where possible colonies should be examined before delivery is taken and the purchaser should make sure that the previous owner has the necessary removal permit from the Department of Agriculture before purchase and removal.

Eradication

The virulence of American foul-brood as indicated in this article makes it clear that once a colony of bees has become infected it is doomed unless drastic measures are taken by the beekeeper to remove all infection, which can be accomplished only under certain favourable conditions.

The main consideration then should be to obtain a quick clean-up of all infected material to prevent the disease spreading to other hives, and a check on the possible source of infection is also desirable. The necessity for that section of the Apiaries Act requiring beekeepers to notify the Apiary Instructor of the presence of foul-brood within seven days is evident.

Under certain favourable conditions an experienced beekeeper may be able to remove the adult bees from a diseased hive and decontaminate them by a meticulous treating process, but this is seldom economical, and the

usual procedure is to destroy the bees. This is best done in the evening when no field bees are out, and is most satisfactorily accomplished by placing a dessertspoonful of calcium cyanide on the bottom board. The most convenient way is to place the powder on a piece of stiff paper and push it in the entrance. The bees are killed in a few minutes and should then be burned together with all combs, frames, honey, and the mat. The fire should be kindled to burn fiercely in a hole to prevent any honey and melted wax from running away, and the earth should be filled in afterward over the ashes.

If the hive cover, boxes, or bottom board are sound, they can be salvaged if they are at once sterilised by boiling them in water for half an hour or by having the insides scorched over with a blowlamp. To do this thoroughly necessitates removing the metal rebates from the boxes so that all corners and crevices are sterilised.

Control of Disease

Control of this disease depends primarily on quick detection in its initial stages, which can be obtained only if all beekeepers are fully conversant with the symptoms and examine their hives at regular intervals. Detection of disease must be followed by prompt and drastic action and prompt notification to the Department of Agriculture.

Beekeepers should seek out and remove colonies of bees that have become established in buildings, trees, rocks, or such places, as such wild hives are not under control and are potential sources of spread of disease to established apiaries. Apart from the legal obligation imposed on property owners by the Apiaries Act to have such colonies dealt with, they would be doing great service to the beekeeping industry by advising

CONTROL OF FOUL-BROOD DISEASE . . .

neighbouring beekeepers of the whereabouts of wild hives.

It has been proved that some colonies of bees are more resistant to foul-brood than others, but a disease-resistant bee has not yet been bred to the stage where it is a clearly-defined strain. The rigorous selection to bees with desirable traits practised by queen breeders today is tending to produce bees with greater disease resistance, and the use of bees of any of these select strains will help in combating foul-brood.

It is apparent that this disease, though of such a pernicious character that it causes great economic loss, could be held completely in check if everyone who has control of bees would see that they are regularly examined for signs of disease and if all owners of property on which wild bees have become established would see that they are properly removed.

The Apiaries Act provides for the registration of all hives of bees so that periodical inspections can be made. The Act also makes it necessary to keep bees in hives with movable

frames to allow an examination of the brood to be made. It is illegal to sell or to move bees and apiary appliances from one location to another without the written consent of the Apiary Instructor for the district, who is also an inspector under the Apiaries Act. This precaution is taken to prevent the transfer of diseased bees and apiary equipment to the neighbourhood of clean apiaries. The Act also prohibits the exposing of honey or material from diseased hives.

The field staff of the Apiary Section of the Department of Agriculture is continually at work combating bee diseases, and research officers are examining all avenues for improved control methods. With the full co-operation of all members of the community they can reduce the incidence of foul-brood to a minimum to the betterment of the honey industry, which also means an accompanying advantage to all branches of agriculture and horticulture, whose welfare is so closely linked with the maintenance of a full and healthy bee population for the pollination of economic plants.

SHOW DATES

THE following are dates and venues of A. and P. shows in November, December, and January.

November 4—Ashburton A. and P. at Ashburton.
November 5—Amberley A. and P. at Amberley.
November 5 and 6—Manawatu and West Coast A. and P. at Palmerston North.
November 11 and 12—Canterbury A. and P. at Christchurch.
November 12 and 13—Wanganui A. and P. at Wanganui.
November 16 and 17—Thames Valley A. P. and H. at Te Aroha.
November 17—North Otago A. and P. at Oamaru.
November 19 and 20—Nelson A. and P. at Nelson.
November 19 and 20—Egmont A. and P. at Hawera.
November 20—Courtenay A. and P. at Kirwee.
November 20—Waimate A. and P. at Waimate.
November 20—Bay of Islands P. and I. at Waimate North.
November 20—Waihi A. and P. at Waihi.
November 20—Taieri Agricultural Society at Outram.
November 26 and 27—Stratford A. and P. at Stratford.
November 27—Kaikohe A. P. and H. at Kaikohe.
November 27—Banks Peninsula A. and P. at Little River.
November 27—Kelso A. and P. at Kelso.
November 30 and December 1—Otago A. and P. at Dunedin.
December 3—South Otago A. and P. at Balclutha.

December 4—Winton A. and P. at Winton.
December 4—Hauraki A. and P. at Paeroa.
December 4—Tokomairiro A. and P. at Milton.
December 4—Whangaroa A. and P. at Kaio.
December 7 and 8—Gore A. and P. at Gore.
December 11—Wyndham A. and P. at Wyndham.
December 14, 15, and 16—Southland A. and P. at Invercargill (Royal Show).
December 18—Otago Peninsula A. and P. at Portobello.
January 8—Blueskin A. and P. at Waitati.
January 15—Waiau A. and P. at Tuatapere.
January 15—Waikouaiti A. and P. at Waikouaiti.
January 21—Palmerston and Waihemo A. and P. at Palmerston.
January 22—Waipukurau A. and P. at Waipukurau.
January 26—Marton District A. and P. at Marton.
January 28 and 29—Horowhenua A. and P. at Levin.
January 28 and 29—Taumarunui and District A. and P. at Taumarunui.
January 29—Tauranga A. and P. at Tauranga.
January 29—Helensville A. and P. at Helensville.

Fourteenth Annual General Meeting of Y.F.C. Federation

MR. D. G. McLACHLAN, Masterton, was elected Dominion president of the Federation of Young Farmers' Clubs at the fourteenth annual general meeting, held in Dunedin last June. Mr. E. Rabbidge, Glenham, Southland, was elected vice-president, and Mr. S. G. V. Avery, then of Sanson, a past president, was elected a patron of the federation.

At the time of the meeting the national Y.F.C. memorial fund had reached a total of £10,401 15s. 3d., and delegates spent some time considering ways of ensuring that the objective of £20,000 would be reached during the 1948-49 federation year.

An alteration to the constitution to provide for an increase in members' subscriptions from 3s. 6d. to 5s. a year was approved, and the increase is to become effective on April 1, 1949. The increase is to be paid by clubs to their district committees to enable district activities to be financed without the need for periodical levies on clubs.

Leadership Conferences

An activity developed during 1948, leadership conferences have proved a stimulating influence on the management of clubs and their affairs generally. As sponsored originally by Mr. S. G. V. Avery the scheme had as its objective the holding of a national leadership conference where the Dominion's most competent speakers would lecture on and discuss the principles of leadership and allied subjects with club officers from all parts of the Dominion.

Such a plan, though admirable, did not prove practicable, mainly because of high travelling expenses. Consequently the Wellington, Canterbury, and Otago-Southland Councils each arranged a separate council leadership conference at a convenient centre. Massey and Lincoln Colleges were made available for Wellington and Canterbury, and Otago-Southland was able to secure adequate accommodation at a works near Balclutha. Auckland Council adopted a different plan and sponsored a series of short conferences organised on a district committee basis.

As a result of the conferences most club chairmen and secretaries have benefited from lectures on leadership, instruction in methods of meeting procedure, and from talks on the movement itself, its aims and objects, background, and future possibilities. The duties of club officials were also dealt with fully at most conferences by competent speakers, and in addition, lectures and demonstrations on farming topics added variety and value to the programmes. So successful have these conferences been that it is the intention of all concerned to arrange a similar series in 1949.

SEED PRODUCTION IN NEW ZEALAND

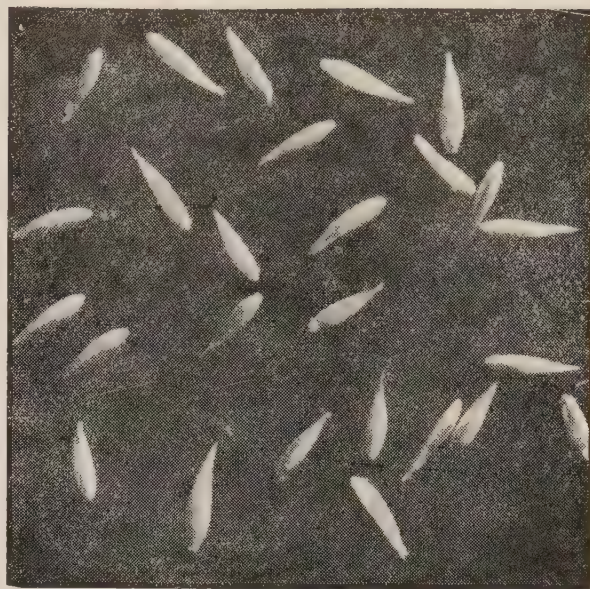
Browntop

By J. G. RICHARDS, Instructor in Agriculture,
Department of Agriculture, Balclutha.

OF the introduced grasses, browntop has become one of the most common in New Zealand, for in many regions it has replaced much of the lowland tussock, particularly in Canterbury, Otago, and Southland. Its aggressive nature has resulted in what were once pure tussock associations becoming pure browntop associations. However, like other plants it is a weed when growing where it should not grow—on first- and second-class lands which are capable of maintaining ryegrass-white clover or cocksfoot-dogstail-red clover swards—but its presence as a pasture constituent in swards on much of the third-class unploughable land is looked on with much favour.

MANY plants are often referred to by several common names, and were it not for the use of standard botanical names much greater confusion than now exists would be experienced in understanding which plant was being referred to. Members of the grass genus *Agrostis* are no exception to this multiplicity of names, for E. B. Levy, in "The New Zealand Journal of Agriculture" for February, 1924, recorded that the following names were used to describe one or all of the three chief species in that genus: Redtop, browntop, Waipu browntop, florin, twitch, creeping bent, carpet bent, velvet bent, *Agrostis alba*, *A. vulgaris*, *A. capillaris*, *A. canina*, *A. stolonifera*, *A. palustris*, and *A. tenuis*.

That case is one of the most extreme, but fortunately most of those discrepancies have been cleared up, and now the chief terms in use are redtop, browntop, and creeping bent, known botanically as *Agrostis alba*, *Agrostis tenuis*, and *Agrostis stolonifera* respectively. Of the three species,



Browntop seed, about 15 times natural size.

browntop (*A. tenuis*) occupies the place of greatest importance in New Zealand agriculture and is grown over a wide range of soil and climate.

Description of Plant

Browntop is a fine-leaved grass, rather erect in habit, and where it has room to spread short rhizomes are produced. The ligule at the base of the leaf blade is very small and often non-existent, contrasting with the prominent and characteristic ligules displayed by redtop and creeping bent. This ligule serves to identify browntop from the other two species.

The leaves of browntop are about $\frac{1}{4}$ in. wide at the base and taper gradually to a point. A perennial plant capable of producing seed for several seasons, its maturity is rather late, seed being harvested from mid-March to May in Otago and Southland. The seed head is fine and when flowering has a rather attractive purple tinge which gives a flowering field a distinctive appearance.

Though three distinct species of *Agrostis* are recognised botanically, in the field a fairly-wide range of types can be observed, suggesting that some crossing between the original species has taken place. As a result, some browntop areas contain more than one type of plant. Coarse types of browntop and types showing a larger ligule, but otherwise typical browntop, are occasionally observed. In addition, a fairly-distinctive type of browntop grows in certain localities, particularly on the Canterbury Plains. This type, which has been named dry-land browntop, is not as suitable as true browntop for use as either a pasture plant or a lawn grass.

Distribution in New Zealand

The distribution of browntop in New Zealand is possibly the widest of all introduced grasses, for it grows under a wide range of conditions—from the sea coast to the upland tussock area, from North Cape to Bluff, and on good, poor, and indifferent soils. In some areas it is the dominant species, in some a major species, and in others just another grass. On the bulk of third-class, steep, and unploughable lands it is a most valuable species because, as well as providing valuable grazing, it helps to bind the soil, thus lessening the ever-present menace of erosion. On the unploughable bush-burn country of the North Island its inclusion in the seeds mixture for surface sowings is advisable so that when the ryegrass, cocksfoot, and clovers begin to run out the browntop is there to take their places and



A browntop seed crop ready for harvesting.

ACREAGES OF BROWNTOP HARVESTED FOR SEED

	1940-41	1941-42	1942-43	1943-44	1944-45	1945-46
North Island ..	—	—	7	—	—	—
Marlborough ..	—	5	—	—	—	—
North Canterbury	68	68	307	141	140	521
Mid-Canterbury	990	1,000	450	1,150	1,597	1,726
South Canterbury	104	185	559	610	777	2,131
North Otago ..	—	4	—	1	42	295
South Otago ..	5,389	6,718	6,522	5,733	8,872	9,283
Central Otago ..	4	52	119	110	165	101
Southland ..	2,195	1,808	2,497	1,487	3,357	3,256
Totals	8,750	9,840	10,461	9,232	14,950	17,313

thus, by its ability to form a tight, compact sward, assist to check reversion to fern, manuka, and pipiriri.

Apart from its use as a pasture species it is famed as a lawn grass, usually being sown with chewings fescue.

Seed-producing Districts

The production of browntop seed in New Zealand is confined mainly to the South Island, Otago and Southland being the principal areas. In Otago Clutha County is the main seed-producing area, and in Southland Wallace and Southland Counties produce most of the seed. Counties in Canterbury the boundaries of which include the foothill country also produce some seed, but the acreage saved for seed in those parts is much less than further south. The counties in Canterbury which produce browntop seed are Levels, Ashburton, Geraldine, Mackenzie, and Waimate. In favourable seasons small acreages have been harvested in parts of Nelson, Marlborough, and Hawke's Bay.

The chief seed-producing areas are those where, generally, the supply of soil moisture is adequate. The soils of these areas are somewhat stiff and

heavy, and these conditions, combined with adequate moisture, are the best for browntop.

Adequate moisture is all important for the browntop plant. Where soils are inclined to dry out, yields of seed are usually poor. Ample rain during spring and early summer plays an important part in the production of high yields of seed.

The table on this page shows the acreage harvested between 1940 and 1945, a period when the demand for browntop was exceptionally high.

All browntop seed harvested now comes from paddocks and blocks of grazing land into which the plant has come as a volunteer. Seed is no longer sown to establish a seed-producing stand, better high-producing crops being obtained at less cost by allowing the plant to establish naturally. This volunteer establishment is quite rapid; within two years from a bare field a dense browntop cover will arise which can be harvested in another 12 months. A method that has been adopted for the establishment of a stand is to sow flat drill turnips, feed them off, and allow the browntop to come in. Such a field should produce high yields of seed, given good seasons, for three or four successive years. However, the bulk of the seed comes from areas that have been sown to pasture which has run out and which are to be ploughed up within two or three years of the time the browntop becomes the dominant grass.

Browntop begins to show up after about three years in pastures which have been poorly treated in the way of lime and drainage, or if poor types of grass and clovers have been sown. Under these conditions browntop may become dominant within four years. These swards, when the ryegrass and white clover die out, will produce a crop of browntop seed for four or five years. At the age of eight years the pasture usually is put under the plough. The average life of a sown sward on the browntop country of South Otago is seven to eight years.

In contrast to the poorly-treated ryegrass-white clover pasture, those which receive adequate lime, are drained, and contain good, persistent strains of grasses and clovers will not tend to run to browntop until they are six to seven years old. At this age such swards may or may not be harvested for browntop seed, and they are more than likely to be ploughed without seed being harvested.

Time of Closing Seed Areas

Yields of seed are highest from fields which have not been subjected to grazing (for example, abandoned properties), and where stock are grazed on areas which will be saved for seed they are usually taken out in October. Sometimes fields are closed as early as September. Closing later than October is likely to be detrimental to seed yield.

Once the seed is set, about March, stock are sometimes allowed on to the area to graze the bottom, but that is not common.

Time of Harvesting

The maturing of browntop seed, like that of numerous other plants, is rather uneven, and sound judgment is necessary to select the correct stage for harvesting. Flowering is late, most of it occurring during February in Otago and Southland and in late January in Canterbury. Fields of flowering browntop are a pleasing sight, for the opened florets and exposed stamens impart a delicate purple tinge to the area.

Seed begins to mature 14 to 21 days after the plants flower, and with the fall of the sap the appearance of the area becomes ashen white. At this stage seed can be rubbed out and, though the bulk of the area may not be ready, harvesting is begun as soon as the completely-formed seed appears. As large areas are usually harvested, it is imperative that the harvest begin as soon as the seed is ready so that as the season progresses all seed set is harvested and the best yields are obtained. The risk of loss from winds and other causes would be too great if the start of the harvest were delayed until all the seed was set. In South Otago the harvest begins about the middle of March and continues for six to eight weeks, depending on the crop; in some years it has continued well into June.



Mature seed heads of the three principal *Agrostis* species in New Zealand. From left—Browntop, creeping bent, and redtop.



The areas of New Zealand where browntop is grown for seed production. Each cross represents about 100 acres.

HARVESTING BROWNTOP SEED



Typical rolling clay country of South Otago from which browntop seed is harvested.

Frosts at flowering time and high winds after the seed is set will lessen the yield. Browntop requires damp conditions for it to thrive, and yields have been high in damp seasons—for example, 1945 and 1946. The 1948 season, being dry, gave disappointing results.

If the seed is ripe, no heating will occur unless seeds of catsear are in the sample, when the danger of heating is ever present. These seeds often make it necessary for browntop seed to be run through the driers. By careful adjustment of their headers, some experienced harvesters are able to reduce the weed seed content to a minimum. These seeds can be dressed out at machine dressing, but seed of *Juncus bufonius* is a common impurity in many lines.

Seed for export requires to be of a very high standard of purity. All seed eligible for certification must reach a minimum purity of 97 per cent. before being sealed and tagged, but most lines reach a much higher standard.

Older stands are earlier maturing and lower yielding than younger ones, and consequently they are usually harvested first.

Harvesting Methods

Implements which have been or are now used in harvesting browntop seed are the reaper and binder, mower,

chain drum and beater strippers, and header harvester.

Believed to have been first used in Southland in 1919, the reaper and binder is now out of favour. Great difficulty was experienced with wet sheaves, for once they took up moisture, conditions for good threshing could seldom be obtained. The fine, dense sheaf was bad for holding moisture at the band. To overcome this dampness, sheaves were collected on sledges, taken to a central area, and covered to await threshing with a wooden mill. That method proved too expensive for the relatively-low yield obtainable. Seven binders operated in one field in 1929, and the material was stooked and then stacked. Because of sweating at the band, difficulty was experienced in threshing.

The mower has also gone out of favour, as more efficient means of harvesting are now available.

Chain and Beater Strippers

Excellent samples of seed can be obtained by using chain and beater strippers, but whereas 10 to 15 years ago thousands of acres were harvested by this type of machine they are now used on only a relatively-small area. Strippers have been replaced largely by the header and are now operated only on small blocks of 10 to 15 acres or as a follow-up after the header on

small ridges where header operation is uneconomic. One advantage of the stripper is that harvesting can be started earlier in the day than with the header and continued later.

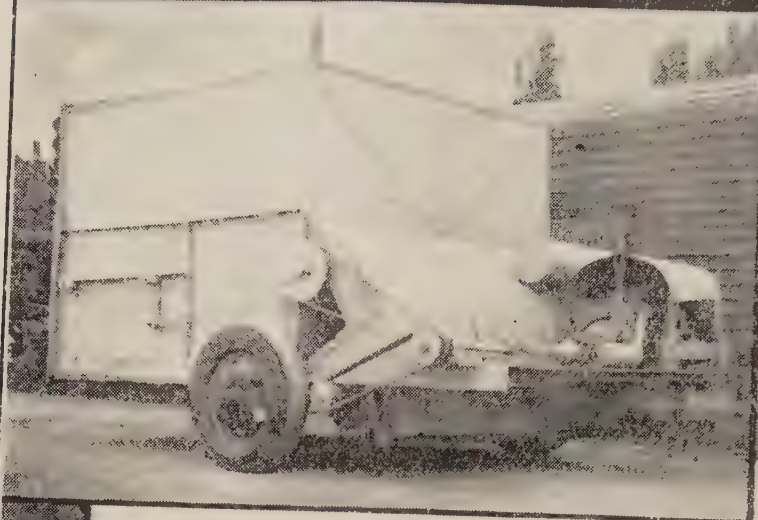
Illustrated on page 396 is a machine made in Balclutha and operating on the chain drum principle. Chains on the drum can be seen hanging beneath the machine. Built to the requirements of a farmer who has had long experience of harvesting browntop seed, this machine is capable of harvesting many hundreds of acres a year, and will strip, in average going, six to eight acres an hour, travelling at from five to seven miles an hour. With this and other strippers the seed harvested contains a considerable quantity of straw, and the material is bagged for screening on the farm or dressing on a modern header. Screens are usually of home construction, made from fine netting which will allow seed to pass through but retain the straw.

In the middle 1930's as many as six strippers operated in one field, and in such cases a set of screens would be set up in the field to screen out the rough material and bag the seed for dispatch to the machine dressing plant. The ordinary stripper is a cheap and efficient machine for the harvesting of small acreages, but its efficiency cannot rival that of a header on larger

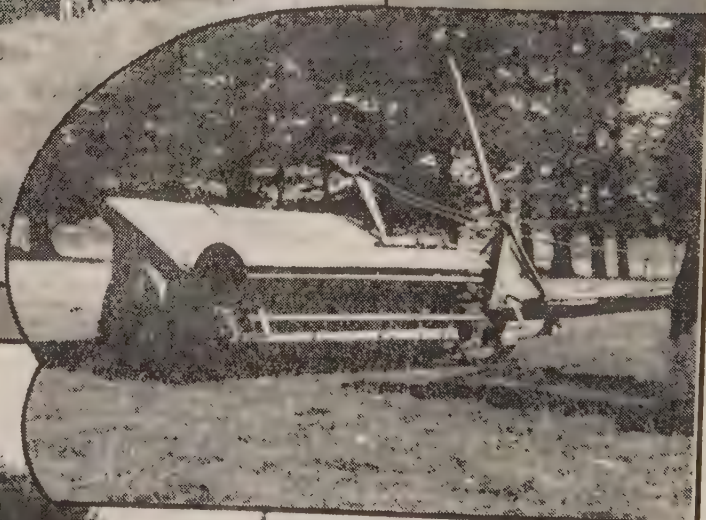


Header harvesters gather most of the browntop seed on the rolling country of South Otago and Southland.

HARVESTING BROWNTOP SEED WITH STRIPPERS



FOR MANY YEARS THE STRIPPER IN VARIOUS FORMS WAS THE CHIEF MACHINE USED FOR THE HARVESTING OF BROWNTOP SEED CROPS.



Upper—A large type of chain drum stripper built in Balclutha. Middle left—A team of horse-drawn strippers harvesting browntop seed in Southland. Middle right and lower—Front and rear views of the most widely-used type of beater stripper. These are now used mainly for the harvesting of relatively-small areas or parts of fields on which it is uneconomic for header harvesters to work.

areas. The stripper has almost gone out of manufacture with the growing popularity of the header.

Header Harvesters

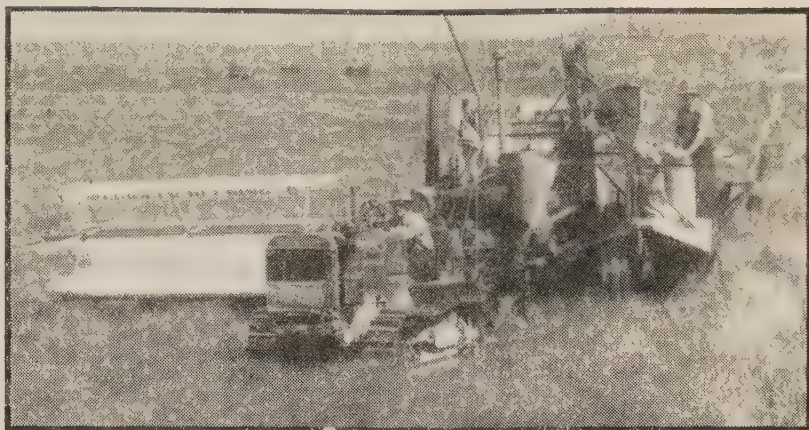
Providing a rapid and efficient means of harvesting browntop seed from large areas, the header harvester, from its introduction to this type of work in the middle 1930's, was quick to find favour, and now most browntop seed is harvested by these machines. Seed from the header is sufficiently free from roughage and straw for it to be sent directly to the machine dressing plant. That these machines are efficient is shown by the example of one farmer who forwarded 86 sacks of field-dressed seed for dressing and obtained 84 similar sacks of machine-dressed seed.

In April and May, when the bulk of the harvest is carried out, atmospheric conditions are often damp. Rarely can harvesting be started before 10.30 a.m., and about 5.30 p.m., when the crop again begins to take up moisture, harvesting stops for the day. With the relatively-few hours available each day when the seed is in condition to be harvested satisfactorily, speed is highly important, and it is here the header finds favour.

As the machine is complex, all adjustments must be correct. Particular attention must be paid to the air blast, and for best results the knife, drum, and riddles should be kept full. Ideal conditions for harvesting seed are a bright sunny day and a light breeze. If the breeze is too strong, irregularities in threshing will occur, especially when turning across or travelling against it. Sound judgment is needed to see that the air blast is adjusted correctly or too much seed will be lost.

With the machine travelling at four to six miles an hour, brushes on the reel are a distinct advantage to sweep the straw away from the knife and give an even feed to the drum. On average rolling country a harvest of 20 acres a day is considered a good coverage for a 12ft. header, though under ideal conditions and on easy country up to 25 acres a day may be harvested. Under such conditions, and in a good crop, two sacks of field-dressed seed an hour should be obtained.

HARVESTING BROWNTOP SEED



Header harvesting of browntop seed in South Otago.

To be remunerative a crop should yield off the header at least seven sacks of well-filled and well-dressed seed daily.

Contract Harvesting

Most browntop seed is harvested under contract by owners of header harvesters. The contractor carries all costs of harvesting and dressing the seed, and the total proceeds are then divided between grower and contractor according to a pre-arranged agreement. Rarely is a contract signed. Proceeds are usually shared on a 50-50 basis, but if the crop is heavy, the contractor may receive only 40 per cent., and if it is light, he may receive 60 per cent. This basis appears to be satisfactory to both the grower of the seed and the contract harvester.

Usually after the contractor finishes with the crop small isolated ridges remain on which the header has not been able to operate. These areas are frequently harvested by the farmer with a horse-drawn stripper.

Yields

An average yield of browntop seed is very difficult to arrive at. Most paddocks are large, and usually only

the better portion of the area is harvested. Yields of up to 100lb. per acre have been recorded from small areas, but probably one-third of that yield may be considered as an average over the total area harvested.

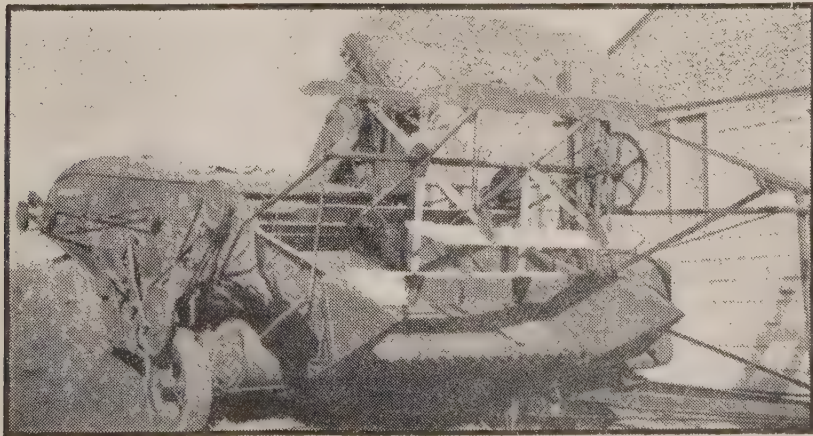
At present prices this return is less than can be expected from better utilisation of the areas through liming and topdressing.

Maintenance of Seed Areas

As the great majority of the area on which browntop seed is harvested is capable of carrying better grasses and clovers, the general trend of farming is to reduce and finally eliminate browntop from pastures. Consequently only in special circumstances are efforts made to foster the browntop. Conditions which would favour the encouragement of browntop are present on relatively-large farms where it is not possible for the farmer to plough up the amount of run-out pastures that he should each year. As these run-out swards provide little financial return from grazing, efforts are made to make them more productive by encouraging the browntop in the hope that a good seed crop can be taken from them.

Removal of the roughage from these fields by fire in late winter and early spring invigorates the growth of browntop. The burn must be rapid and cool, for if it is too hot, too much bottom is burnt out, and with the coming of the hotter and drier weather the surface of the paddock will dry out. Drying out of the soil at this time of the year is detrimental to the growth of browntop, which demands moist conditions. After a good burn in early spring seed can be harvested in the next autumn. Yields from this type of sward are not very high, but in the following year or two good yields should be obtained.

As well as burning for regeneration, the skim plough was sometimes used. The browntop sward was skim ploughed in winter, and by the following February a good, vigorous stand of browntop was usually present. That method is rarely used now. Such a renewed sward will produce good yields for three or four years. As the



A modern header harvester.

QUANTITIES OF BROWNTOP SEED CERTIFIED (cwt.)

	1930-31	1931-32	1932-33	1933-34	1934-35	1935-36	1936-37	1937-38	1938-39	1939-40	1940-41	1941-42	1942-43	1943-44	1944-45	1945-46	1946-47
North Canterbury			7					16	58	13					2	34	59
Christchurch	Included under North Canterbury					13	78	99	112	59			25	59	65	122	95
Mid-Canterbury	403	170	257	224	359	225	181	452	696	435	345	102	70	203	380	704	615
South Canterbury			234	95	514	114	515	247	499	11	110	72	199	89	348	1,216	384
Waimate	Included under South Canterbury																208
North Otago								8	46							103	87
Central Otago		20	20	18	4	13	5	16	12	8	3	5	1	6	5	22	33
Maniototo									30						230	188	82
Otago	438	1,246	509	621	1,484	907	6	35	18	2		4	27	16	30	79	86
South Otago	Included under Otago or Western Southland					1,197	519	2,396	853	542	1,291	1,305	708	2,670	2,917	1,731	
Eastern Southland	Included under Western Southland					857	549	1,114	823	488	504	231	530	941	789	940	
Western Southland	423	335	177	104	1,073	628	477	345	488	294	194	277	350	394	635	730	774
Totals	1,264	1,771	1,204	1,062	3,434	1,900	3,316	2,286	5,469	2,498	1,682	2,255	2,208	2,005	5,306	6,904	5,093

yield of seed in the first summer after skimming is usually low, one farmer sows linseed on the ploughing, harvests this, and then allows the browntop to come in and give good results in the second year.

In all cases the browntop comes in naturally.

Uses of Browntop Seed

The widest use to which browntop is put in New Zealand is its inclusion in seeds mixtures for the sowing out of unploughable hill country. Such land reverts readily to secondary growth such as manuka and fern, and as these lands are difficult to topdress, it is imperative that the seeds mixture sown include a range of species that will cover all fertility levels.

As a lawn grass, especially when sown with chewings fescue, browntop is unsurpassed, and the mixture of these two grasses is now standard for such purposes as the sowing of croquet lawns, golf greens, and tennis courts where a fine, even, hard-wearing surface is required. It is usual to sow one part of browntop to two parts of chewings fescue at the rate of 1 to 1½oz. per square yard.

Seed Certification

A scheme of certification covering browntop seed was inaugurated in the 1930-31 season. Its purpose is to

identify lines of seed of typical browntop, free from coarse types and from creeping bent and redtop. Dry-land browntop is excluded from the certification scheme.

Only one class of seed is recognised—"New Zealand Certified browntop." Any area of browntop of known type is eligible for certification. Before final sealing and tagging, machine-dressed seed must reach a minimum purity standard of 97 per cent.

Exports and Prices

Since 1927, when some 401cwt. of seed valued at £3094 was exported, mainly to the United States of America, the export of browntop seed has increased yearly, until in 1947 6844cwt. valued at £129,126 was shipped abroad. For many years the United States took by far the greatest amount, but during the past decade the United Kingdom has been the chief purchasing country. Australia and Canada are also annual importers of New Zealand seed, and in some seasons seed is shipped to the Netherlands, France, Germany, and other European countries. The bulk of seed shipped is Certified.

The price of browntop has been subject to great fluctuations during the past two decades, giving rise to a good deal of speculation by farmer and merchant. In recent years the price has varied from 3s. to 4s. per

pound. In 1944 up to 4s. 4d. was paid by merchants for machine-dressed Certified seed. In 1934 the price was 1s. 6d. During the past few years seed has had an opening offer of from 2s. 3d. to 2s. 6d. per pound, which usually has risen to between 3s. 6d. and 4s. During the past season the price of 2s. 3d. to 2s. 10d. was one of the lowest for a few years. (Prices quoted are merchants' offers to farmers for machine-dressed seed.)

Undesirable on Good Land

Browntop seed has been harvested in New Zealand for 30 years or more, and during this period many types of *Agrostis* species have been harvested as browntop. Only with the introduction of the Government certification scheme could genuine browntop free from other types be recognised.

In some years browntop seed has given high financial returns, but most of the browntop seed-producing area is ploughable land which, by liming, top-dressing, and the use of good grass strains is capable of much higher production. High prices for browntop seed during the past few years have tended to keep more of this land under browntop than should be the case.

Browntop has a definite place in the farm economy of New Zealand, being a most valuable plant on third-class unploughable land, but its presence on better-class lands, where its incidence is much too high, is undesirable, for such land is capable of much higher production than it now returns under browntop dominance.

Pig Broadcasts

UNDER the auspices of District Pig Councils broadcasts will be delivered in November as under:—

Auckland—1YA, on November 23, at 12.35 p.m., "Piggery Layouts—Location or Type of Layout," by H. E. Clark, Supervisor, Auckland District Pig Council.

Wellington—2YA, on November 18, at 12.35 p.m., "How I Get Two Litters off per Sow in a Season" (management discussion), by I. H. Owtram, Supervisor, Taranaki District Pig Council.

EXPORTS OF BROWNTOP SEED (tons)

	Certified										
Country	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947
United Kingdom	43	99	87	107	3	41	81	59	84	46	106
Australia	30	31	30	26	22	9	17	14	19	18	37
Canada	15	11	31	20	15	13	13	22	29	41	41
United States ..	3	—	4	20	1	9	1	—	93	87	38
Other Countries ..	4	5	2	—	—	—	—	3	1	19	14
Totals	95	146	154	173	41	72	112	98	226	211	236

	Uncertified										
Country	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947
United Kingdom ..	21	26	61	35	1	3	13	11	35	8	28
Australia ..	2	6	7	4	4	1	—	3	6	11	12
Canada ..	—	4	—	—	1	2	1	—	—	—	—
United States ..	—	—	8	1	2	7	—	—	25	63	29
Other Countries ..	2	5	4	—	—	—	—	—	—	21	37
Totals	25	41	80	40	8	13	14	14	66	103	106

Care of Livestock During November

Contributed by the Animal Research Division.

ALL dry ewes should be drafted off and shorn as soon as possible. During shearing they should be carefully inspected to decide which should be culled. Particular attention **DRY EWES** should be paid to the udders, as many lambs die because they cannot get a drink during the first few days after birth. All ewes with udders which were empty at lambing and ewes with diseased udders, damaged teats, or very large teats should be culled. Dry ewes with defective mouths and old ewes which have not had a lamb should also be culled. Dry ewes which are retained should be kept in hard store condition during the summer, as this will help to ensure successful mating next autumn.

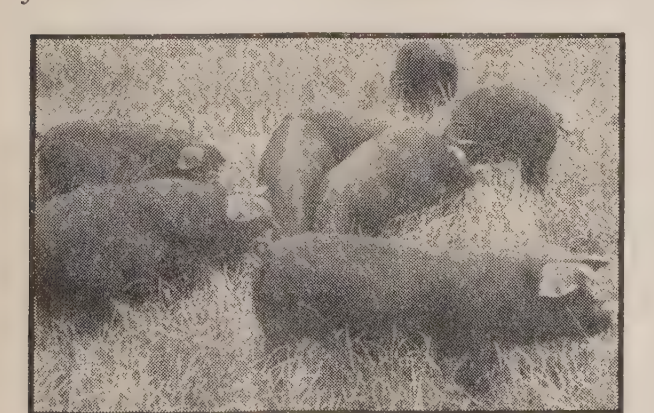
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Many young calves are lost every year from scours. To prevent this buckets and pens should be thoroughly cleaned whenever they are used.

CALF SCOURS Calves should not be kept in a small paddock which rapidly becomes foul, but should be rotated through the paddocks a few days ahead of the cows. They should be given a little good hay daily when they reach six weeks of age. If scours do occur, veterinary advice should be sought early, as sulphaguanidine, which can be obtained only on veterinary prescription, is one of the few effective remedies.

* * *

The difficulties experienced in supplying penicillin cream have been overcome and adequate supplies are now available from veterinarians or chemists. Best results are obtained when cases are treated early, and the disease can often be recognised in its early stages only by the use of a strip cup as described in the article on page 11 of the July issue of the "Journal."



The red mite of poultry feeds only at night and lives in cracks and crevices during the day. Perches should be sprayed or painted with creosote at 3-day intervals until no further mites are seen. **POULTRY MITES AND LICE**

Poultry lice can cause considerable loss of condition as well as reduction of egg laying. To control them a trickle of 40 per cent. nicotine sulphate should be run along the perches on a calm night before the birds go to roost. Two or three treatments should be given at weekly intervals.

* * *

Cows should not be served within 30 days after calving, as conception rates are poor during this period. Accurate records of service dates and bulls used **MATING OF DAIRY COWS** should be kept for all cows. This will enable calving dates to be forecast and if breeding troubles occur, the information will prove of great assistance in arriving at a correct diagnosis.

* * *

Dry sows should have access to good pasture and should also receive from 2 to 4 gallons of milk a day, depending on their condition. **CARE OF PIGS** They should be kept thriving, but should not be allowed to become too fat. Only as many of the spring litters as can be fed adequately should be kept for baconers; the remainder should be sold as porkers.



These are facts about ELASTRATOR castration and tailing—written by successful farmers. Read—then put the ELASTRATOR method to work yourself. Full details from your Stock Agent, or ELASTRATOR CO., LTD., P.O. Box 226, Blenheim. "METHOD WILL BECOME UNIVERSAL," says one of the first farmers to use Elastrotor. He does 1,200 high country lambs, makes a practice of docking all lambs under one month old. "I DO 2,500 LAMBS IN TWO DOCKINGS," writes another, "and consider Elastrotor nearly 100 per cent. There is nothing to approach it!" This is the Modern Method—the rubber ring is affixed to the purse, above the testicles. Circulation is stopped. The testicles and purse atrophy and fall off, completing castration.



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Outdoor Tomatoes from December to June

PRACTICES FOLLOWED IN AUCKLAND DISTRICT

DURING the past century the tomato (*Lycopersicon esculentum*), which is a native of South America, has come into prominence in the national diet, outranking in popularity almost all vegetables except the potato. The tomato is grown very widely in home gardens and is cultivated extensively on a commercial scale. It is produced both outdoor and under glass. Large quantities are grown outdoor for the commercial manufacture of juice, sauces, soups, chutney, and for canning. In this article S. O. Gillard, Instructor in Vegetable Culture, Department of Agriculture, Auckland, describes the practices followed in the outdoor culture of tomatoes in the Auckland district, where fruit in the open ripens from December to as late as June.

TOMATOES flourish in a warm climate, with plenty of sunshine. Cold, cloudy weather or prolonged periods of relatively-low temperatures not only retard normal development, but may seriously reduce fruiting capacity. Adequate moisture spread over a frost-free growing period of 6 to 7 months is necessary for the production of high yields of good-quality fruit.

Tomatoes can be grown on a wide variety of soils, but the ideal soil type is a deep loam overlying a well-drained subsoil. Light, sandy soils are more suitable for

the production of early crops, but moderately-heavy soils are necessary for a heavy main-crop yield.

The climate in the Auckland district is particularly suitable for tomato growing and fruit ripens outdoors from December to as late as June in the more frost-free localities. The main centres of production are the more-favoured vegetable-growing areas adjacent to Auckland, such as Avondale, Mangere, Otahuhu, Panmure, and also at Pukekohe, which is 30 miles south of Auckland City.

Of a total of about 900 commercial vegetable growers who operate within a radius of 30 miles of Auckland, approximately 40 per cent. are engaged, to some extent, in the production of tomatoes. Individual holdings producing table tomatoes are small, ranging from $\frac{1}{4}$ to 3 acres. Larger plantings are usual where tomatoes are grown for factory use, and the average individual area would be about 7 acres; the largest is 65 acres.

It is estimated that district production for table and household use is about 3800 tons a year and for factory supply about 4500 tons. Production per acre is generally higher for table tomatoes and averages about 14 tons per acre, compared with 11½ tons per acre for factory tomatoes.

Crop Rotation

In market gardening, cultivation is more intensive and crops follow one another much more closely than in any other type of farming, so that it is necessary to adhere to a sound system of crop rotation and related crops such as tomatoes and potatoes should not follow one another. Root vegetables—carrots, parsnips, etc.—can be planted in ground which previously carried a heavily-manured crop of brassicas or tomatoes. A recommended cycle of crop rotation is: Cabbage, followed by tomatoes, and then by carrots or similar roots. While it is not always possible to follow a desirable programme, at least growers should avoid successive crops of the same vegetable family.

OUTDOOR TOMATOES FROM DECEMBER TO JUNE



[Sparrow Industrial Pictures Ltd. photo.]
Fig. 1—A profitable crop of tomatoes.

The risk of building up soil diseases peculiar to any one type of crop is greatly lessened by crop rotation, which also permits the best use to be made of the available soil fertility, as different crops use different proportions of various plant foods.

Varieties

There are many varieties of tomatoes of both tall and dwarf kinds. Tall varieties, because of their smooth, round fruit, are favoured for table use, while the main dwarf varieties, which have crinkled fruit, but can be produced more cheaply, are preferred for factory supply. However, in the early part of the outdoor-tomato season the first fruit of the dwarf varieties is packed for market. Later in the season a small portion of the smooth, round dwarf kinds such as Tatura and Tatinter is also marketed for household use.

Among the most popular tall varieties grown commercially in the Auckland district are Potentate, Best of All, Market Favourite, Supreme, and Bonny Best. Break O'Day and Beefsteak, both of which carry very large, solid-fleshed fruit, are favoured by home gardeners. Of the dwarf varieties, South Australian Dwarf Red and Pale Leaf are the most popular. The latter is a Victorian variety characterised by its vigorous growth and very pale green foliage. It is specially favoured for early production. Tatura and Tatinter, recent introductions from Australia, are dwarf varieties which carry smooth, round fruit and are favoured for canning. Tatura, however, is very susceptible to fruit cracking and does not carry well. Tatinter is less susceptible to cracking and carries well.

Seed

Only the best seed should be purchased; the extra expense for good

seed is a very small item. Many growers prefer to save their own seed by selecting the best fruits from carefully-chosen, vigorous plants carrying heavy, disease-free crops of typical shape. When the plants from which it is intended to save seed have been selected, fruit from the first two trusses may be harvested and marketed, but the remaining fruit should be left to ripen fully on the plant, and a final selection then made of the choicest fruit.

Extraction of Seed

Seed extraction may be done by the fermentation or by the acid-extraction method.

Fermentation method: The pulp is squeezed into a container and left to ferment for two or three days. Seed and some pulp will then have accumulated at the top of the vessel, which will permit the juice to be decanted. Next, water is added and, after the sound seed has settled, the water and defective seed, which floats, are poured off. The seed is rinsed several times and spread thinly on trays and sun dried.

Acid extraction: The fruit is weighed and the pulp then squeezed into a wooden container. Commercial hydrochloric acid is added, allowing 1 fl. oz. of acid for each 5lb. of fruit, and the acid stirred into the pulp with a wooden stick. Occasional stirrings are given during the next three hours. The seed may then be placed in a fine sieve, washed under running water, and set out to dry in the sun. Acid extraction is fast and it overcomes difficulties associated with the fermentation method resulting from prolongation of fermentation in cold weather and rapid putrefaction of the pulp in very hot weather.

Seed Sowing and Care of Seedlings

Seed may be sown early in June

for the early crop, in late August for the main crop, and about the middle of November for the late crop, which is planted out in January. An ounce of seed should produce from 2000 to 2500 plants.

Soil composed of one part clay loam, one part well-rotted farmyard manure, and one part sharp river sand, well mixed and passed through a fine sieve, is the most suitable for raising seedlings. Soil which has already been used for tomato seedlings should not be used a second time. Seed boxes should be a standard size—about 24in. by 12in. and 3in. deep. Two rows of $\frac{1}{2}$ in. holes 6in. apart lengthways and 4in. apart the narrow way should be bored in the bottom of the boxes to provide drainage.

Soil Sterilisation

It is advisable to sterilise the soil and trays. Formalin—one gallon of 40 per cent. commercial formaldehyde to 49 gallons of water—is suitable for this purpose. The soil, which should be just sufficiently moist that when compressed it will retain its shape without soiling the hand, may be spread about 1ft. deep on the floor of a shed and the formalin applied with a watering can fitted with a fine rose. The quantity required will be approximately 5 pints per cubic foot of soil. After the formalin has been applied the soil should be covered with sacks for 48 hours and then turned to disperse fumes. Additional turnings will facilitate dispersal of fumes, which may take from 3 to 4 weeks according to the quantity of soil treated and the number of turnings. All traces of fumes should have disappeared before the soil is used. Trays should be dipped in the formalin solution and allowed to dry.

Alternatively, trays may be filled with soil and watered with formalin solution. The trays should then be stacked one above the other and the top layer covered with sacks for 48 hours. Dispersal of the fumes can be facilitated by breaking down the stack and stirring the soil in the trays.

When seed boxes are being filled the fibrous material caught in the sieve should be placed in the bottom of the boxes and covered with the sieved soil. The soil should be firmed evenly, paying particular attention to the corners and leaving the soil about $\frac{1}{2}$ in. from the top of the box. Seed should be scattered, not too thickly, and covered with a light layer of finely-sifted, sandy soil. Boxes should be watered using a fine rose, covered with glass, and a sheet of paper placed on top. They should then be put in the propagating house. Seedlings will appear in from 7 to 10 days, when the covering should be removed. The optimum temperature range for germination and growth of tomato seedlings is from 60 to 65 degrees F.

Where large numbers of plants are to be raised it is advisable to construct a special propagating house. Houses are usually 25 to 50ft. long by 12ft. wide, with glass or wooden sides 4ft. 6in. to 5ft. high. Wooden benches 4ft. wide and 3ft. high run the full length and both sides of the house, leaving a centre pathway.

Pricking Out

Suitable compost into which to prick the young plants can be prepared by using two parts of clean, turfy loam, one part of well-rotted farm manure, and one part of fine sand, to which should be added 2lb. of superphosphate for each cubic yard of compost. It should be well mixed and run through a fine sieve to remove lumps. The mixture and all trays should be sterilised.

Spent hops, old strawy stable manure, partially-decomposed leaf mould, etc., may be used to cover the bottom of the trays, but the litter, when firmly pressed down, should no more than quarter fill the trays, which should be topped up with the prepared soil, compacted, and levelled ready for the young seedlings.

Pricking out may be done 7 to 10 days after seedlings emerge. Seedlings should be handled carefully by the leaves and placed in the soil almost up to the seed leaves, allowing about 2in. each way between the plants. Soil should be firmed gently against the roots with a small wooden dibbler. If the weather is bright, the newly-set-out plants may need shading for the first day. Watering may be done the following day, using a fine rose; further waterings should be limited to just sufficient to keep the plants growing, as a relatively-dry atmosphere will greatly reduce danger of frost injury and the risk of infection by fungus diseases.

When plants are 6 to 8in. high they will be ready for planting out, with the exception of those being raised for the early crop. The latter are usually grown in trays 1in. deeper than the standard trays, with only 12 plants in each. They are allowed to grow until the first truss of fruit has set and may be 15in. high before being set out.

Before being planted out the young plants are gradually hardened off by increasing the ventilation in the propagating house and by placing the trays outside in a sheltered position for the final week before planting.

Some growers prefer to raise their plants for main and late crops in specially-prepared raised beds under movable glass frames. The beds are about 4ft. 6in. wide and any length desired, and are protected by wooden frames 12in. high at the back and 9in. high in front. Frames are covered with glass sashes. Seedlings are not pricked out into these beds until they are about 2in. high. They are spaced 8in. each way. When the plants are 6in. high the glass sashes are replaced by scrim and for the final week plants are left uncovered.

Soil Preparation

Adequate and thorough preparation of the soil before planting is important if the best results are to be secured. Where a green crop has been grown it should be discd into the soil at least 4 to 6 weeks before planting and at least half a ton per acre of carbonate of lime, which is approximately the annual requirement of Auckland soils, should be broadcast over the area.

A fortnight before planting, the land should be deeply ploughed and worked

OUTDOOR TOMATOES FROM DECEMBER TO JUNE



[Sparrow Industrial Pictures Ltd. photo.]

Fig. 2—Inter-row cultivation being done with a light tractor having cultivator teeth attachments.

down to a fine tilth with discs and harrows. The ground may be loosened up and weeds destroyed by discs or harrows just before plants are set out.

If pasture land is to be used for tomato production, it should be skim ploughed in late autumn or early winter, followed by deep ploughing, across the furrow, in early spring. Frequent discing supplemented by harrowing and rolling will secure adequate tilth.

Fertilisers

In growth and productiveness the tomato plant responds well to liberal manuring. The type of soil, the kind of crop previously grown in the land, and the climate all play important parts in determining the composition and quantity of fertilisers to be used. Many growers have individual preferences in fertiliser mixtures, but it is possible here to give only a general guide for average conditions.

Base Dressing

For average loam soils the following dressing should be applied:—

	cwt.		cwt.
Superphosphate	4	Potash (sul-	
Bonedust	.. 4	phate or	
Blood and bone	4	muriate)	.. 2

Less potash may be used on clay loams and the heavier soils. The fertiliser mixture is applied at the rate of a ton per acre. The whole of the fertiliser requirements of the plant is not applied as a base dressing, because additional quantities, especially of nitrogen, are required to swell the growing fruit. If this nitrogen were applied with the base dressing, it would be assimilated largely by the growing plant and lead to lush, soft growth, predisposing the plant to disease attack and leaving little nitrogen for the later needs of the crop.

Side Dressings

One or more side dressings should be given at the fruiting stage. Equal

parts of dried blood and superphosphate are usually applied at the rate of 5cwt. per acre. The manure is sown along the rows, but care should be taken to see that it does not come into contact with the leaves or stems of the plants. The fertiliser should be lightly worked into the soil.

Planting

In a few favoured localities it is possible to plant in September for early production and in January for late production, but the main planting is done during October and early November.

After the final soil preparation the field is marked out into shallow furrows or lines. For large fields this may be done with cultivator teeth attached to the tractor, while on small areas lines may be drawn by using a wooden marker constructed like a rake, but having only three teeth. The distance between rows will vary according to the variety and the method of culture; 3ft. 6in. will be sufficient for the less-vigorous dwarf varieties such as South Australian and Tatura, but 4ft. 6in. should be allowed for the stronger-growing dwarf kinds such as Australian Large Red and Pale Leaf. For the tall varieties the lines should be drawn 4ft. 6in. apart where the single-row system is adopted and 5ft. apart when tomatoes are grown on the double-row system. With the latter method the plants are set out 9in. each side of the marked line.

After the field has been marked out the fertiliser is spread along the lines of the rows and lightly worked in. Because experience has shown that planting immediately after the fertiliser has been spread has, at times, resulted in damage to the roots, it is customary to allow 2 to 3 days to elapse between manuring and planting.

Before being planted out the young plants should be given a good watering. The trays can then be laid out at convenient distances along the rows.

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[Sparrow Industrial Pictures Ltd. photo.]

Fig. 3—Tomato plants supported by strings tied to the base of plants and to overhead wires. Plants are trained anti-clockwise round the strings.

The plants are cut out in squares and set slightly deeper in the soil than they were growing in the trays. It is usual to water the plants after setting them out to consolidate the soil around the roots. The distance between plants varies according to the variety. Of the dwarf varieties, South Australian Dwarf Red, Tatura, and Tatinter may be set out with 3ft. between plants, but for Pale Leaf and Australian Large Red 4ft. spacings will be necessary. Tall varieties when grown on a single stem may be as close as 18in., but 2ft. 6in. should be allowed between plants if the two-leader system is adopted. Plants with three leaders should be 4ft. apart.

Several growers are using mechanical planters, which, besides being faster, do planting and watering at the same time; the machines, however, are suitable only for large and moderately-level areas.

For the early crop plants are kept in the trays until they develop the first truss of fruit, and when plants are set out the roots and up to 9in. of the stem are layered at a depth of 4in. in the soil. "Hairpins" made of 18in. of No. 8 wire are used to support the plants to prevent them from being blown about by strong winds.

General Culture

Dwarf varieties require very little training, but with early plantings it is customary to train plants to three or four main stems and to stop growth two leaves beyond the third truss to encourage early development and ripening of fruit.

Training Tall Varieties

There are a number of methods for training tall varieties and some of the more popular are as follows:—

(a) The simplest method and the one usually adopted by the home gardener is to stake each plant separately. Planting is on the single-row system and as growth is made the plant is

supported by successive ties, four usually being sufficient.

(b) Posts are set at 20ft. intervals, with a wire 4ft. 6in. from the ground running directly above and the full length of each single row. Lengths of binder twine, one for each plant, are used to support the vines, one end being tied loosely to the base of the plant and the other fixed to the wire. The twine should be slightly slack and as the plant grows it is twisted anti-clockwise round the twine; no tying is required (see Fig. 3).

(c) A further method where the single-row system is used is to erect a fence of three wires, the first wire 12in. from the ground, the second 15in. above the first, and the third 18in. above the second (see Fig. 4). Plants are tied to succeeding wires as they grow. Where this method is adopted it is usual to allow two or three leaders to develop.

(d) Posts are placed 20ft. apart, with a wire 4ft. 6in. from the ground and above the centre between double rows of plants. Lengths of binder twine are used to support the plants as in (b). The essential difference, however, between this method and that explained in (b) is that two rows are trained up to a single overhead wire. In planting, the plants in the second row of each pair of rows are not set opposite those in the first row, but are staggered. This gives more room for development.

(e) The same method of planting as in (d) is used, but 7ft. manuka stakes are used instead of the twine and the wire is 5ft. from the ground. Stakes are set 3in. outside the plants, with 2ft. between the rows of stakes at ground level, but only 18in. between the rows of plants. The tops of the stakes are drawn in and tied at regular intervals to the wire (see Fig. 5).

(f) Four manuka stakes 7ft. long are set 2ft. apart each way to form a square and the tops drawn together wigwam fashion and tied. One plant on a single stem is trained up each stake (see Fig. 6).

Tall varieties grown for the main crop are usually trained on a single stem, but for the late crop it is usual to train the plants with either two or three leaders. With the last two systems the plant does not grow as high as on a single stem and therefore is less subject to damage by late-autumn winds. Moreover, the lower-set fruit secures the maximum benefit from the heat radiated from the soil.

Where plants are trained with two leaders the strongest lateral shoot near the ground is selected to form the second leader, and for three leaders an additional strong lateral shoot is retained. All other lateral growths are removed. Leaders should be stopped one leaf past the third truss of flowers by pinching off the top of the plant.

As the plant grows lateral growths develop in the axils of the leaves and these should be pinched out as soon as they appear, using the thumb and forefinger.



[Sparrow Industrial Pictures Ltd. photo.]

Fig. 4—Plants trained on a fence of three wires.

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Where tomatoes are grown on the single-stem method it is usual to let the plant reach the top of its support before stopping it. In tying plants to supports care should be taken to leave sufficient room in the loop of the tie for the development of the stem. If this is not done, the tie will cut into the plant, not only retarding growth, but possibly causing a fracture.

Treatment of Foliage

The leaves are the food-manufacturing organs of the plant and they should be protected from damage, either by pests and diseases or winds. It is not advisable to shorten the leaves back during the early growing period except where leaves are in contact with the soil. As the lower fruit trusses begin to ripen a limited amount of pruning is permissible, but only those leaves making dense growth round the ripening fruit should be shortened. More leaf pruning may be done on late crops to assist ripening, as there is little risk of sun scorch late in the season and the maturing fruit will need all the sunshine possible.

Cultivation

From the time the plants are set out in the field frequent cultivation is necessary to control weed growth and to conserve moisture. However, cultivation near the plants should be very shallow or the root system will be damaged and growth retarded.

Pests and Diseases

Unfortunately the tomato plant is susceptible to attack by many pests and diseases and in the warmer, high-rainfall districts the fight against disease infection is unceasing. In order that growers may recognise the more common diseases a brief description of them is given here.

Late Blight (*Phytophthora infestans*)

This disease usually appears first as dark brown areas on the leaves, which may spread to stems and fruit if the disease is not controlled. Infected

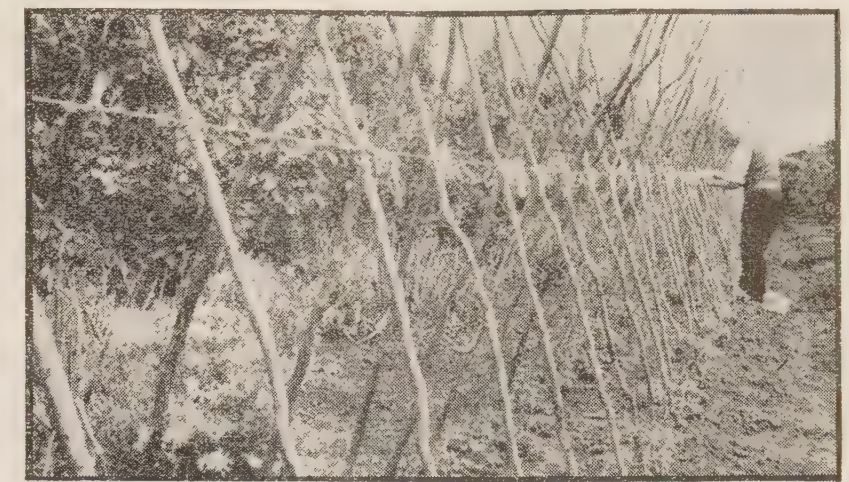


Fig. 5—Double row of plants trained up stakes. [Sparrow Industrial Pictures Ltd. photo.]

fruits develop russet-brown, marbled areas and eventually shrivel and become brown. Late blight is also common on potatoes.

Phoma Rot (*Phoma destructiva*)

This fungus, which attacks both leaves and fruit, shows first on the leaves as small brown or black areas with a definite but irregular outline. frequently infection commences at the leaf margins. Badly-infected leaves dry out and are shed prematurely. On the fruits the disease is characterised by sunken spots, generally round the edge of the stem scar, which, as they enlarge, develop brownish-black centres.

Septoria Leaf Spot (*Septoria lycopersici*)

Septoria leaf spot is generally more prevalent on autumn crops. The older leaves are usually affected first

and early infection shows as small spots having a water-soaked appearance. As the spots enlarge they become more circular and the affected tissues become sunken and darker, varying in colour from grey to brown.

Blossom-end Rot

This is a very common trouble which affects the fruit only. The causal agent is not disease and the condition has been attributed to sudden fluctuations in moisture, which result in the collapse of the cells at the blossom end of the fruit. Lack of water during the period of maximum fruit expansion, followed by an excess of moisture, appears to create the most favourable conditions for the development of blossom-end rot. In its early stages the trouble appears as a small spot at or near the blossom end of the tomato and at this stage the affected area has the appearance of a bruise, being water-soaked and dark green. As the size of the affected area increases the tissues become firm, leathery, and brown to black. At times the whole of the blossom end of the fruit becomes flattened and black. Losses from blossom-end rot can be minimised by keeping an adequate moisture supply in the soil during dry weather.

Sclerotium Disease (*Sclerotinia sclerotiorum*)

Sclerotium disease usually affects the stem of the plant at some point above ground level, and the affected area becomes bleached in appearance. Infection is followed by wilting of the foliage, and eventually the plant dies. If the affected portion of the stem is cut open, it will be found to be lined with hard, black, irregular-shaped bodies. Infected plants should be removed and burnt. Sprays are of little value in the control of this disease, but constant cultivation in spring will assist in reducing the incidence of the disease.



Fig. 6—Plants trained up a "wigwam" of four stakes, one plant to each stake. [Sparrow Industrial Pictures Ltd. photo.]

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Spotted Wilt

This disease, commonly called "bronze top," is caused by a virus and is the most serious of the diseases with which the outdoor-tomato grower has to contend. Infection shows first as small, pin-point, dark-coloured spots on the terminal shoot and leaves. The top of the plant soon becomes stunted, the young top leaves tend to curl downward, and little or no further growth is made. Irregular brown and bronze markings appear on the leaves as the disease progresses through the system of the plant, and fruits may show irregular mottling of lighter or yellowish colour or distinct concentric markings. Control measures consist of removing and destroying infected plants as soon as the disease is noticed. Thrips, the main agents in the spread of the spotted wilt virus, should be kept down by spraying.

Mosaic

This virus causes a mottling of the leaves which is sometimes accompanied by leaf distortion, especially on the dwarf varieties. The mottling shows as light yellowish-green irregular areas in the leaf-blade tissues. The fruit is sometimes affected by the disease and may show slight irregularity or "mistiness" in the red colouring. The disease is not as serious in its effect as spotted wilt. The virus may be spread by the hands from plant to plant when laterals are being removed or during tying-up operations. Mosaic also affects tobacco and is usually present in manufactured tobacco. It may be spread to tomato plants by a worker who handles tobacco in rolling cigarettes. Plants badly infected with mosaic should be removed and burnt. Workers who smoke tobacco should wash their hands thoroughly before handling clean plants.

Tomato Worm (*Heliothis armigera*)

This caterpillar is one of the most common garden pests. Its habit of boring into tomatoes and eating the

contents has endowed it with the name of "tomato worm." The caterpillars vary in colour from green to brown, with reddish or yellowish markings.

Tomato Stem Borer (*Gnorimoschema plaesiosema*)

Plants are frequently lost through the ravages of the larvae of the tomato stem borer moth. Eggs are laid on the leaves of the tomato plant and the young caterpillars burrow into the main stem, which is hollowed out, causing the plant to collapse.

Disease Control

For control of fungus diseases Bordeaux mixture 3 : 4 : 50 (4oz. blue-stone and 5oz. hydrated lime to 4 gallons of water) is used. Applications should be made every 7 to 10 days, according to weather conditions and the severity of disease locally. Cuprox, a good controllant of diseases, and less harsh in its effect on the foliage than Bordeaux, has been found very satisfactory for tomatoes. The recommended mixture is 4 to 5lb. per 100 gallons (3oz. to 4 gallons of water).

Lead arsenate powder (3lb. per 100 gallons of water or 2oz. per 4 gallons) is the usual remedy for insect pests. Applications should be made every three weeks.

Recently D.D.T. has come into prominence for the control of insect pests. For spray application a quantity of wettable D.D.T. powder sufficient to give a strength of $\frac{1}{2}$ lb. of actual D.D.T. per 100 gallons of water should be used (2lb. of 25 per cent. powder per 100 gallons of water).

For satisfactory control of diseases and pests complete coverage is essential. This means frequent applications done thoroughly and carefully so that all portions of the plant are wet. Failure to secure adequate control of pests and diseases is frequently the result of faulty application, or of allowing too much time to elapse between sprays.

Knapsack sprayers are relatively satisfactory for home gardens, and for the smaller commercial plantings may give good results while the plants are still small. However, on commercial areas more effective results can be secured by the use of motor-powered spray outfits. The higher pump pressure achieved by the power outfit produces a finer and more penetrating spray which greatly assists in securing thorough coverage. A satisfactory tractor-drawn, row-crop sprayer is shown in operation in a dwarf-tomato plantation in Fig. 7. This type of outfit greatly facilitates speedy and efficient work.

Harvesting

The stage of maturity at which tomatoes should be harvested will depend upon the purpose for which they are intended. For supply to factories fruit is not harvested until fully coloured, when it is picked into tins and then placed in wooden containers (usually provided by the factory), which are transported from the field direct to the factory.

The stage of maturity at which dessert tomatoes are picked is governed by the length of time it will take the tomatoes to reach the market. For the local market fruit is picked when well coloured, but firm; fruit for more distant markets should be showing little colour, but must be fully developed and past the dull green stage, or ripening will be unsatisfactory.

Where necessary, fruit should be wiped to remove spray residue, colour graded if desired, and then graded for quality and size. It is not desirable to pack fruit of mixed maturity and size in the same container.

In the Auckland district tomatoes are usually marketed in the No. 6 (7in. x 7in. x 18in.) package and the No. 8 (4½in. x 12in. x 16in.) package—the dimensions are inside measurements. For advice on the packing of tomatoes the New Zealand Department of Agriculture Bulletin No. 225, "Packing Tomatoes in Standard Packages Nos. 6 and 8," which is available from all offices of the Department, should be referred to.

The New Zealand Grown Vegetable Regulations provide that one end of the case must be branded with the registered mark of the grower and the name of the fruit. It is also customary to add the grade of the fruit and the shipping or forwarding mark. Many growers use attractive coloured labels on which the necessary information is set out; such labels do much to increase the sales appeal of the package.

For the successful production and marketing of tomatoes a high standard of husbandry is necessary. Much of the failure to secure heavy, disease-free crops is due to slipshod methods.

Acknowledgment

Acknowledgment is made to the Plant Diseases Division of the Department of Scientific and Industrial Research for assistance in the preparation of the section dealing with diseases and their control.



Fig. 7—Spraying a crop of dwarf tomatoes. [Sparrow Industrial Pictures Ltd. photo.]

Latin Plant Names are Important to the Amateur Gardener

BOTANICAL names of plants, written in Latin, look unfamiliar to most home gardeners, who may even be deterred from using a first-class garden plant by a name that looks unpronounceable. Yet botanical names are necessary and can be most helpful to the gardener who understands them. This article by J. P. Hudson, formerly of the Horticulture Division, Department of Agriculture, Wellington, explains the system of naming plants and the advantages accruing from a knowledge of it.

HOME gardeners, especially women, often find plant names bewildering and hard to understand. There are so many of them, and those in Latin at first are hard to read, pronounce, or understand. Yet the whole art and craft of gardening, which is playing an increasing role in the national life and can do so much to improve amenities for individuals and communities, depends on the recognition of each plant by some sort of name that will be understood by all who write, read, or talk about it.

It is worth while for all gardeners to get a grasp of this subject once and for all. The recent publication of lists of plants highly recommended for garden planting makes this an appropriate time to consider the whole question of plant names.

Why not Use only Common Names?

The first reaction of the new gardener is: "Why use Latin names? Leave those to the scientist, and let gardeners use only common names." At first that sounds reasonable, and no one would suggest that plants like roses or wallflowers, apples or raspberries, cabbages or potatoes should be called by any other names than these, which are understood by every English-speaking person even remotely interested in gardening—though the words would not mean much to a gardener in France, Brazil, or China, where each plant would be known by an entirely-different local name, if it is grown at all.

However, without worrying about what the common plants are called overseas, what of the many garden plants for which there are no common names in the English language? Botanical gardens and nurseries are continually introducing new plants from abroad. Some of these have a well-established local name in their country of origin, but would those names be acceptable in New Zealand? Names which sound "common" in Japanese, Polish, or Arabic might look very odd to English-speaking people and prove hard to pronounce and even harder to spell. Everyone knows what a "potato" is, and "batata" (Arabic) is not dissimilar, but "urala kizhangu," "iyan ebo," "okukunduku," and "dankalin turawa" would not convey much, though they are all current local names for the same vegetable.

Then what of plants that have never had a common name, here or elsewhere? Gardening for beauty is one of the more recent developments in the history of culture, and only in recent years have plants become widely used for their ornamental value alone. Native plants used for food or other useful purposes usually have had a recognised common name among the inhabitants of the district where they grow, but plants that are purely ornamental very often have not been given any local common name, as they have been of no value to the people and therefore it has not been necessary to refer to them in speech. Consequently, many of the finest garden plants of purely ornamental value have no common names, and never have had them even in the districts from which they have been introduced.

Thus, common names do not seem to be the answer to the need for garden plants to have names, either because a plant may have many different common names in different parts of the world, or because it has no common name at all, even in its country of origin.

Introduction of the Binomial System

The medieval monks probably were the first gardeners



[Douglas Elliott photo.]

Gardeners who want an upright-growing plant as a "feature" to set off some place in the garden are often puzzled to know what to plant, as few shrubs or trees have a columnar habit of growth. One of the best, and one that will not quickly become inconveniently big, is the Italian cypress (*Cupressus sempervirens stricta*).

to realise the need for a universal system of naming plants, suitable for use when writing to each other about recipes for using herbs and simples in which it was essential not to get the plants confused. They devised a system of describing each plant precisely in Latin (the normal language of educated people in those days) and using that description as the name of the plant. That system was a step in the right direction, but as the plant name often consisted of a dozen or more words it was more suitable for those unhurried days than it would be now, and became rather cumbersome as more and more plants were brought into cultivation.

The system was simplified greatly by Linnaeus, a Swedish botanist, who suggested that each plant should be given a name consisting of only two parts—the binomial system—and that this name and no other should be used for the plant everywhere. In 1753 Linnaeus published a most important book called "Genera Plantarum," written in Latin, in which were listed all the plants he knew, giving for each a two-part name and a brief description, which Linnaeus considered would enable other botanists to identify the plants with certainty.

Moreover, to make certain that there would be no mistake, Linnaeus also collected specimens of most of the plants, dried them carefully by pressing them, and mounted them in such a way that they could be looked at by future scholars who were in doubt about the identity of any plant in the list. This collection of "type plants" is still preserved in London, where even now it is often

Examples of Plant Names and Their Meanings

Sophora (*Edwardsia*) *tetraptera*.—The native kowhai, which used to be called *Edwardsia tetraptera* but should now be called *Sophora tetraptera*.

Meconopsis betonicifolia (*baileyi*).—The blue poppy which was well known for years as *Meconopsis baileyi* but should now be called *Meconopsis betonicifolia*.

Leptospermum scoparium var. *martini*.—a named variety of the native manuka (*Leptospermum scoparium*). The use of the word "var." is optional and it is not usually included in varietal names in the "Journal."

Cornus capitata (*Benthamia fragifera*).

—The so-called "strawberry tree" was originally known as *Benthamia fragifera* but this name has been superseded by *Cornus capitata*, which should now always be used. The old name will gradually fall into disuse.

Kniphofia sp.—This indicates a species of the genus *Kniphofia*. "Sp." would indicate that more than one species of the genus was referred to.

Berberis x stenophylla.—The "x" denotes that the plant is a hybrid—that is, the result of a crossing of different species.

consulted by botanists, while many other similar collections (herbaria) are held by museums and botanical gardens in all parts of the world.

Plants Classified by Linnaeus

In his great work Linnaeus went much further than giving each plant a name, as he also classified the plants into groups. Each different type of plant was called a "species," but species which bore a striking similarity in certain features were grouped together into one "genus," and genera which had similar features were again grouped into larger families called "natural orders."

Each of Linnaeus's binomial plant names was written thus: *Viola odorata*; the first word is the **generic name**, borne by all the members of the genus to which this species belongs, and the second word is the **specific name**, denoting which species of *Viola* the plant is.

Linnaeus, and other botanists of his time, believed that each species was fixed and changeless. The name applied to each species was thus quite satisfactory, as it was thought that no other type of plant could match the published description so nearly as to be confused with it, and any plant which was similar but not quite the same could be given another specific name. All went well for a time, but soon the system which looked so fool-proof began to break down.

Duplication of Names

A major drawback in those days of few books and poor communications was that a botanist often described and named a plant which, unknown to him, had already been described and named by another botanist elsewhere, and it became common for a species to be known by several binomials at the same time in different parts of the world. That plainly could wreck the whole scheme and bring it into disrepute, so it was decided wisely that the first name published with an adequate description should be accepted as the correct one, with the proviso that names published before 1753 should not be considered.

Thus it became necessary to attach to the binomial a third part showing the **authority**—that is, the name of the botanist who gave the plant this name.

The authority is usually shown in abbreviated form, and it is printed in a different type from that of the binomial as it is not part of the name of the plant. *Viola odorata* L. or *Viola odorata* Linn. denotes that this is the *Viola odorata* described by the botanist Linnaeus.

Amendment of Names

Further amendments to the rules became necessary as other unexpected difficulties arose, and these were all finally consolidated in the International Rules of Botanical Nomenclature, introduced at various international horticulture conferences. The rules do not affect gardeners much, but are very important to plant breeders who are choosing names for new varieties and, of course, to professional botanists.

Occasionally it is necessary to change the name of a plant, usually because it is found that a different name was published before the one in common usage, or because further study has shown the need to revise a genus. That is very annoying to the gardener, who may have been familiar with the plant all his life and is loath to learn a new name, but these changes must be accepted with as good

a grace as possible, as they are never made without a very good reason.

Darwin's theory of evolution showed that Linnaeus had been wrong in supposing that species were fixed and changeless, and it became clear that plant classification should be based on relationship and common ancestry rather than on similarity of structure. Plants should be grouped together in a genus because they are related rather than because they are similar in appearance. However, the earlier botanists' powers of observation had been so acute and their classification so "natural" that very few changes have had to be made to Linnaeus's original classification as a result of later work. The new science of genetics is enabling botanists to study the relationships of plants from another angle, and in time that may result in a few more commonly-accepted plant names having to be changed.

To help gardeners over the first difficult period after a plant's name has been changed, it is usual for a few years to include the old, well-known name in parentheses as shown in the examples on this page. The old name is gradually dropped, and finally forgotten, as more and more people come to know the plant by its newer, correct one.

How Latin Names should be Written

The first (generic) name must always be written with a capital letter, but the specific name normally should be given a small initial letter. The use of a capital letter for the specific name is optional if the plant is named after a person (not country) or another genus of plants, but many authorities now use small letters for all specific names, regardless of their origin, and that is the practice now being followed in the "Journal." The exact form and spelling of the Latin words, especially their endings, is a subject of scholarship rather than gardening, but corrupt spellings of some names have become common. The general rule is that the spelling used by Linnaeus in 1753, or the first record after that date, should be used.

The question of pronunciation is always a bugbear to new gardeners, but a name, however pronounced, will serve its purpose. In the pronunciation of botanical names gardeners have a few conventions, not all of them based on a careful study of the Latin tongue, but the way in which a plant name is pronounced is relatively unimportant as long as it can be understood. Home gardeners are recommended to follow local usage and not to be perturbed if their pronunciation of a word is different from that of the seedsmen or local parks staff.

Need for General Sorting out

Despite the clearly-defined rules for the naming of plants there is still a great deal of confusion, especially in the naming of varieties of the important fruits, flowers, and vegetables grown in gardens. In some cases two or more distinct varieties are known by a single name; much more commonly, a single variety may be known by two or more different names.

The gardening public always seems eager to buy something new—a

Naming of New Varieties

The international rules for naming new varieties of plants, introduced in 1939, say:—

Do not Latinise real names. *Smithii* or *Dorotheana* would be incorrect; just call the variety Smith or Dorothy, in plain English.

Begin each variety name with a capital letter.

Keep the variety name simple, not exceeding three words at most. "Pride of Marlborough Sounds" or "Mrs. Henry Smith's First Choice" is very bad form.

Do not use titles. "Sir Henry" or "Miss Sylvia Jones" is wrong; "Henry" or "Sylvia Jones" is correct.

Do not use "a" or "the." "A Triumph" or "The Prizewinner" should be "Triumph" or "Prizewinner."

"novelty"—especially if it is eulogised in a well-presented catalogue. Knowing that, unscrupulous seedsmen or nurserymen sometimes bring out an old variety under a new name, thus adding to the confusion of plant nomenclature. New names applied to plants which already have a name are called "synonyms." The prevalence of synonyms is one of the curses of the present-day horticultural trades, detested alike by good gardeners and reputable traders.

Two names applying to one plant is just as confusing as one name applying to two distinct varieties, and an effort to sort out mistakes that have resulted from both these causes would be welcomed in New Zealand by nurserymen and gardeners alike.

Meanwhile, it is inexcusable for more new names to be applied to varieties already named, and it is to be hoped that public opinion will harden against this practice, which is followed only to meet the pressing demand for "novelties" from uninformed gardeners.

A gallant attempt has been made to sort out the correct botanical names and suggest the best common names for nearly all the plants grown in gardens in America in "Standardized Plant Names," a large and expensive book published in the United States in 1942. This book would not solve New Zealand's difficulties, even as a work of reference, as it does not include many of the plants grown here, especially the natives, but perhaps some day someone will produce a similar volume on standardised plant names in New Zealand.

Protecting Names of New Varieties

The preceding few paragraphs do not, of course, refer to the naming of genuine new varieties of plants. Gardeners who may have spent years in developing a new variety of plant can reasonably expect their work to be recognised and credit given for their patience and judgment. In some countries new varieties of plants are patentable, but plants are not at present included in the British code of patent laws.

However, the raiser's claim for the credit of having raised a new variety can be protected by the proper publication of the name and description of the variety, but raisers often overlook this important step. For it to be valid, the Royal Horticultural Society of Britain states that the "publication of a name of a horticultural variety or hybrid is effected by a recognisable description, with or without a figure in any language written in Roman character, preferably in English, French, German, Italian, or Spanish. The description must appear in a recognised horticultural or botanical periodical, or in a monograph or other scientific publication, or in a dated horticultural catalogue which must be deposited in the library of the chief horticultural society of the country" (for example, the Royal New Zealand Institute of Horticulture in this country). Raisers should remember that the appearance of a name on a

WORK IN THE FLOWER GARDEN



[Douglas Elliott photo.]
Magnolia stellata bears a profusion of scented white flowers in late spring on a shrubby tree up to 7 or 8 ft. high.

label in the garden or on a show bench is not enough to secure proper recognition of a variety.

Another method by which new plants can be officially recognised in New Zealand is by registration with the Royal New Zealand Institute of Horticulture, on payment of a small fee. Full details of this scheme can be obtained from the secretary of the institute, P. O. Box 1368, Wellington.

Not Perfect, but very Helpful

The question of plant names affects gardeners vitally. The present system, which at first seems difficult and clumsy, is really quite logical and, moreover, is the one accepted all over the world, so the home gardener's best plan is to study it and thus reap the many benefits it confers on those who understand it.

In "The Living Garden" Professor E. J. Salisbury, Director of the Royal Botanic Gardens, Kew, England, says that gardeners can often be grouped into those who know their plants but not their names, and those who know the names but do not know their plants. Obviously it is better to know the plants and be able to grow them properly than to know the Latin names of plants that only languish in one's garden, but an understanding of the binomial system of nomenclature undoubtedly is a great help to the keen gardener—a stimulus in his work and a common bond with other horticulturists. It may not be the ideal world-wide system, in which every plant would have only one name, known everywhere, always used, and indicating the plant's relationship to others, but the present system is workable and very useful.

GARDEN WORK FOR NOVEMBER

The weekly "go through" becomes more important as the summer advances. Dead heads should be cut off, weeds pulled out, and individual annuals or bedding plants that are bearing poor flowers or washy colours ruthlessly rogued. Cut down plants that have been overflowing and notice whether any staking is required.

Annuals can still be sown in the flower borders, but germination is likely to be uneven if the weather is hot and the surface soil dries out. Box-grown plants are much more reliable for late plantings. Complete the thinning of annuals sown earlier, giving each plant ample room in which to develop.

Bedding plants such as pot marigolds can be planted at almost any time of the year, and a few boxes of these plants are always worth while in case they are needed for filling gaps in the borders—another of the ways in which the gardener must always be looking well ahead. Sow a box of seeds now to provide plants if they are required early in the new year; no great loss will be incurred even if they are not used. Pot marigold plants raised from late sowings make a fine display in autumn and winter. Bedding plants growing in boxes usually need not be fed, but if they cannot be set out when ready, it is worth while to water them with liquid manure, washed in with pure water. Keeping the plants growing in the boxes is better than letting them get yellow and starved before being planted out. Tender varieties of bedding plants, such as zinnias, salvias, African and French marigolds, nemesias, and petunias, should now be

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planted as soon as possible in late districts where sharp frosts are unlikely after the beginning of November. In inland hilly situations where frosts occur regularly even in summer these varieties of bedding plants may not be satisfactory, as they need relatively high temperatures for proper growth. Hardier types of bedding plants, such as stocks, antirrhinums, pot marigolds, and *Phlox drummondii*, will probably give more satisfaction. Water the boxes an hour or two before planting, and syringe them with water each evening if hot weather follows planting. If the soil is very dry, take out the holes for the plants and fill them with water a little while before planting, but do not plant at once or the soil will be churned into mud by the trowel and later will set in a hard lump.

Bulb foliage should continue to be cut off as it changes colour. It makes a valuable material for putting on the compost heap. Tulips and daffodils to be lifted should be dug up and put in an airy place to dry off. On no account should tulip bulbs be left in sunshine even for a few hours, as high temperatures interfere with their proper development. Tulips are best lifted every year unless planted very deeply, but daffodils need be lifted only every 2 or 3 years.

Chrysanthemums can now be planted out even in the colder districts, but frame-raised plants should first be hardened off. Plant them in clumps of three or more plants 15in. apart.

... WORK IN THE FLOWER GARDEN

Dahlias can still be planted out in cold districts where late frosts make earlier planting unwise, and late plants can be put in in mild districts to make a late autumn display. Plants set out earlier in milder districts and now growing strongly should be thinned, if necessary, by removing a few of the shoots. These are best pulled up gently with a sideways twist to snap them off the roots. Three or four strong shoots to each plant are ample, and fewer for dahlias being grown for exhibition. Each plant should be supported with one or more strong stakes, well driven in so that their tops are a little lower than the average height of flowers. Tie the plants to the stakes with twine so that the wind cannot twist the stems at their bases or snap their tops off, but do not bunch the stems too closely together, as that makes the plants look unnatural.

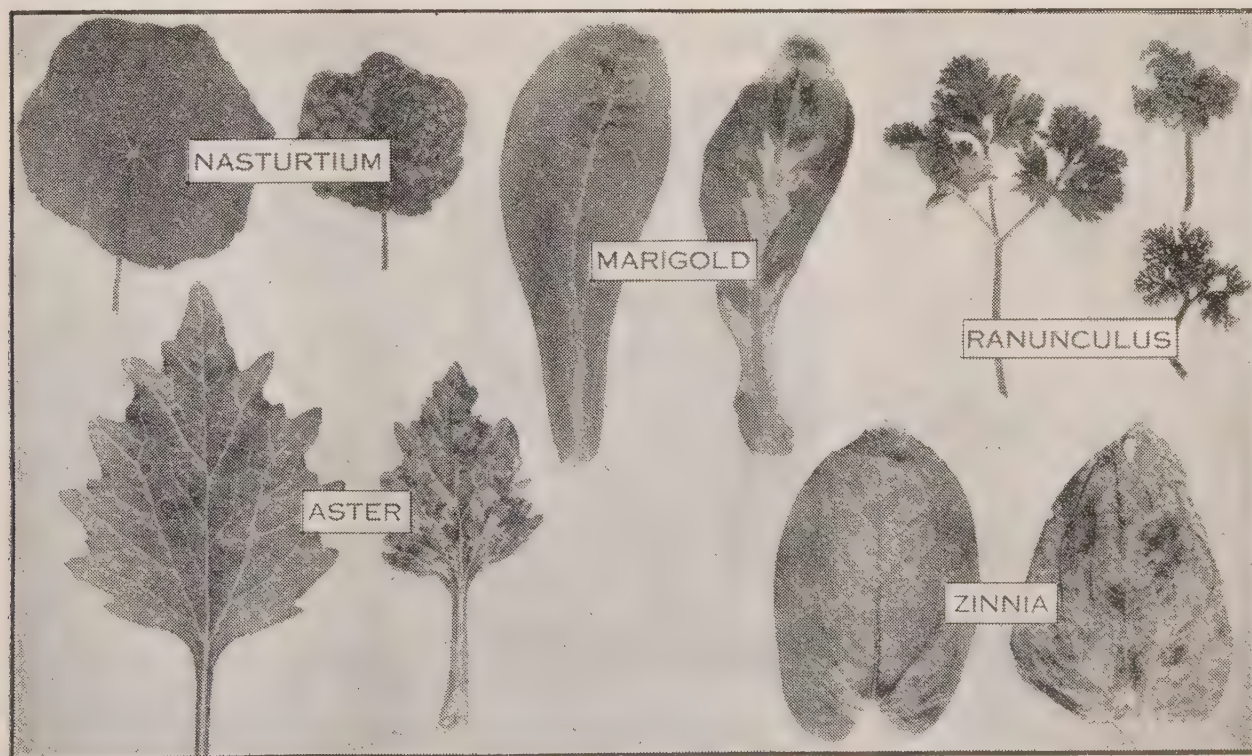
Dead flower heads should be removed weekly without fail. If that is neglected for even a few weeks, many of the seeds will be nearly ripe and will ripen in the compost heap, where some may be killed by the high temperatures but a few usually survive. These will be a nuisance when the compost is used. Heads removed weekly will be much less mature and few of the seeds will ripen. Another point in favour of weekly removal of dead heads is that green flies tend to

congregate around the flowers of many plants. By disposing of colonies on the heads, regular removal of fading flowers does something toward keeping down green flies in the mixed flower border without the need for spraying.

Gladioli should be staked unless the garden is well sheltered. One thin stake is usually pushed in behind each plant, 2 or 3in. from its stem, and one tie just below the bottom flower on the spike usually will suffice. Dig out and burn all plants which start to wilt or go prematurely yellow during the growing season, as those are signs of disease and such plants, if left in the ground, would infect it for another season. It is worth while to remove some of the soil surrounding each plant and bury or burn it with the plant. If any corms remain, these should now be planted for autumn flowers, but often they are very disappointing, however much care may be given to their culture, and attack by thrips is especially severe on plants growing in late summer.

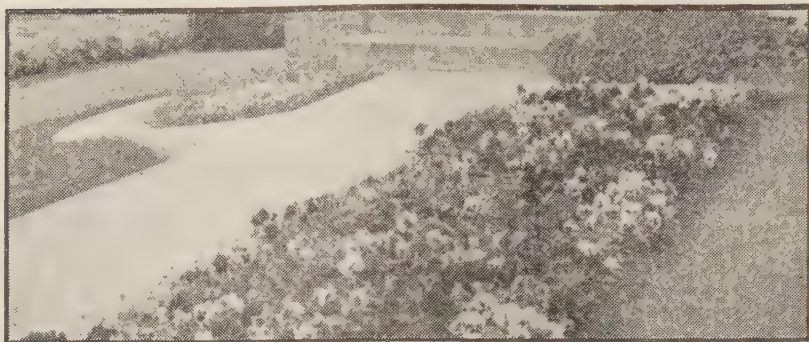
Hedges should be given their first clipping of the season as soon as spring growth makes them look ragged. The clippings should always be put on the compost heap.

Herbaceous plants producing too many young shoots should continue to be thinned, as far as possible the superfluous shoots being pulled out by



Spotted wilt disease, caused by a virus and spread by thrips, is one of the greatest scourges of the garden, attacking and spoiling a very wide range of plants. Any flowers or vegetables showing abnormal, distorted, stunted, or variegated leaves should be pulled up and burnt at once. Only by this ruthless policy of destruction can home gardeners hope to keep this virus disease under control. This illustration shows healthy leaves of a few common flowers (left in each case) compared with leaves affected by spotted wilt.

WORK IN THE FLOWER GARDEN



Beds of pansies and violas are at their best in early summer. Fading flower heads should be picked off to keep up the standard of blooms, which soon begin to be very small if the plants are overloaded with developing seed pods.

their roots. The final thinning should be done before the plants are staked. Shoots which have some roots can be used for filling gaps elsewhere in the border.

Plant out pot-grown fuchsias, heliotropes, and fibrous-rooted and large-flowered begonias in the mixed flower borders to add interest and "body" to the bedding scheme. They will flower all through the summer. Geraniums, balsams, lobelia, and other tender plants can be planted out in cold districts as soon as risk of frost is past.

Pot plants being fed with fertiliser, as recommended last month, should be watched carefully for signs of over-feeding. The fertiliser should maintain full growth in the plants and a good colour in the leaves, but if the leaves turn very dark green, the plant probably is getting more nitrogen than it requires to keep it in good health and no more fertiliser should be used until the foliage looks more normal. Starved pot plants may not flower at all, but overfeeding is also to be avoided in flowering plants, as it usually results in fewer flowers.

Prune shrubs which flower in spring and early summer on shoots that grew last year—for example, lilac, weigelas, flowering currants, forsythias, and early brooms. As soon as the flowers fade cut off the shoots that have flowered to encourage ample new ones to grow during this season to flower next spring.

Roses should be disbudded if large, well-formed blooms are wanted for cutting or exhibition. Disbudding consists of taking off all buds except the main flower bud as soon as they can be handled, thus concentrating all the energies of the plant on developing this one bud. Roses grown for garden display need not be disbudded, but many gardeners prefer to take off some of the buds to increase the size of the flowers that remain. Disbudding has the desired effect only if done early.

Shrubs such as camellias, hydrangeas, rhododendrons, and azaleas should be mulched with compost, sawdust, leaves, or any other available organic material to conserve soil moisture and provide the loose, littery soil covering which these shrubs seem to like.

Water thoroughly before applying the mulch if the soil is dry.

Stake in plenty of time all plants that need support. Bushy twigs are useful for plants like geums which have a semi-sprawling habit, but stakes are better for plants that grow more upright.

Sweet peas growing strongly in the milder districts should be fed as described on page 615 of the December, 1947, issue to produce heavy crops of flowers. Feed them when the flower buds start to show. Sowings and plantings of sweet peas should now be made in the latest districts.

Wallflowers are perennial—that is, each plant will live for years, but



Tulips also give their best display in October and November. Inspect them daily as the flower buds develop and destroy any plants which show symptoms of "breaking." Spray with nicotine sulphate at the first sign of green flies on the flowers.

usually they are grown in the garden as biennials, sown one season to flower the next. Seeds should be sown in November in cool districts, or later elsewhere, in boxes or drills, and transplanted later into beds, where strong, bushy plants will grow by late summer. These will be planted out in autumn to flower next spring. This year's display of wallflowers, forget-me-nots, and the like will be almost over, and the plants should be pulled out to make way for spring bedding plants. In a mixed border a few wallflower plants can be cut back hard and left to produce a few flower spikes in autumn, when the summer bedding plants are failing.

Other Tasks for the Month

Sow anemone seeds in boxes or pots. Trim *aubretia* and other spring-flowering rock garden plants when they finish flowering, cutting them back hard.

Pinch out the tops of all *chrysanthemums* before they are a foot high to make them grow more bushy.

Dry off *cyclamen* plants, the corms of which will be stored through the summer.

Plant out spring-rooted cuttings of *herbaceous plants* from the cold frame.

Stake *herbaceous plants* that need it.

Turn *pot plants* growing in windows every few days to prevent them from growing lop-sided.

If necessary, give spring-planted *shrubs* and *trees* a good soaking of water. If they flag in hot weather, spray them with water in the evenings or rig up a temporary hessian shade to protect them from hot sunshine.

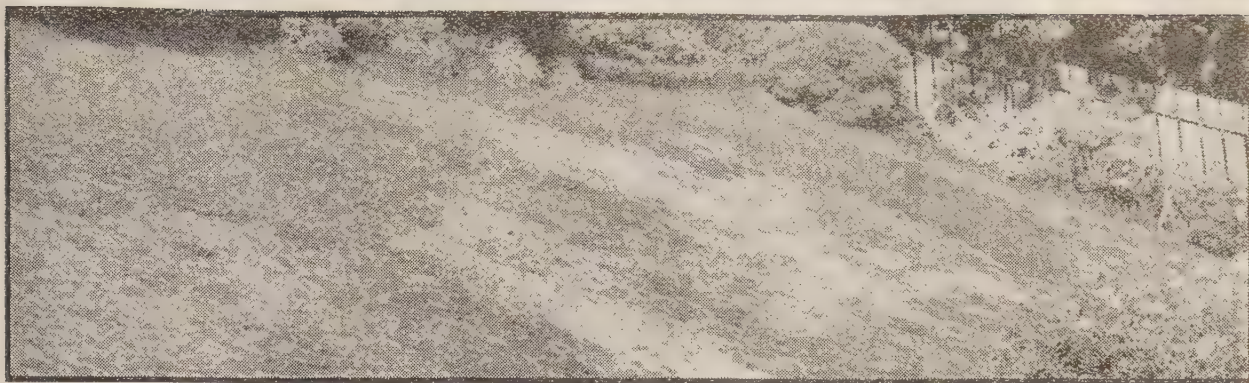
Put a stack of *turves* to rot to supply loam for compost.

Plants to Propagate this Month

Polyanthus should be lifted when they have finished flowering, pulled apart into separate crowns, each with roots and a few leaves, and then planted 9in. apart in rows in some odd corner of the vegetable garden. During summer they will grow into large plants, which can be put into the flower borders in autumn to flower next spring. Alternatively, the crowns can be planted back into the flower border, but the former method is best, as they are not particularly ornamental in summer. *Polyanthus* left year after year without being divided grow overcrowded and produce only small flowers. Annual division is essential if really large flowers with long, stout stems are wanted. The newer, improved strains of *polyanthus*, easily raised from seed, are a great improvement over the old-fashioned yellow type. *Primula* species such as *P. wanda*, *P. juliae* and *P. denticulata* can be multiplied in the same way. Not enough use is made by home-gardeners of the free-flowering, hardy *primulas*.

Sow in pots seeds of the *primula* species that make useful flowering plants for growing in the house or border. These include *Primula obconica* (which causes a rash on the skin of some people), *P. sinensis*, *P. malacoides*, and *P. stellata*.

WORK IN THE FLOWER GARDEN



Yarrow should be included in grass seeds mixtures used for sowing dry banks. The yarrow stays green all through the dry summer months, long after grasses have turned brown. On this bank, photographed at the end of a long, dry summer, the yarrow (dark patches) is still green, whereas the grass (light patches) is quite brown.

Seeds of cinerarias can also be sown now. Small seeds need very little covering of soil, but should be watered gently with a rose after being sown to settle them into the soil. Cover them with newspaper to prevent the soil drying out until they germinate. Prick out earlier-sown seedlings of polyanthus and primulas as soon as they can be handled. The usual practice is to prick them out into boxes $1\frac{1}{2}$ to 2 in. apart, and later pot them or plant them out into the border in late summer to flower next spring.

Many other seeds can also be sown, including geums, pansies, sweet

williams, Canterbury bells, pentstemons, forget-me-nots, delphiniums, double daisies, aquilegias, evening primroses, and scabious.

Reminders About Common Troubles

Geranium rust each year ruins many geraniums by causing brown, rusty spots all over their foliage. This disease can be controlled by spraying the plants regularly about once a fortnight with a mixture containing 2 fluid ounces of lime sulphur and $\frac{1}{2}$ fluid ounce of colloidal sulphur in 2 gallons of water. The plants should be looked over before spraying and

all affected leaves picked off and burnt, as it is from these that the disease spreads to the new foliage. Sulphur sprays should not be allowed to touch the house, as they discolour paintwork.

Grass-grubs, which can ruin lawns, are the larvæ form of a brown beetle which usually starts to fly in November, laying eggs in or on the soil. The larvae which develop from these eggs become creamy-white grubs with brown heads and swollen abdomens, recognisable from the fact that they are always found curled up in the soil. The grubs feed on the roots of plants, especially grass, and can cause whole areas of lawns to wither and die in summer and autumn. The pest is not an easy one to control. Unlike the subterranean grass caterpillars, the grubs never come to the surface, so they cannot be controlled by poison baits. The most efficient method of control seems to be the application of $\frac{1}{2}$ to $\frac{3}{4}$ oz. of lead arsenate (spray quality) a square yard in November each year, watered in if possible. Though expensive, this dressing should protect the lawn for the season. A heavier dressing of $1\frac{1}{2}$ oz. a square yard, applied evenly as a spray in water and then watered in, is said to proof the lawn against grass-grub for several years and may be cheapest in the long run.

Pests on pot plants: Fuchsias, balsams, and other pot plants likely to be attacked by red spider should be watched closely from now on. The first sign of attack is the appearance of small white dots on the upper surfaces of the leaves, each dot marking the spot where a spider has been feeding on the underside of the leaf. The most efficient method of controlling red spider on pot plants is to spray with white (summer) oil, but where only a few plants are to be dealt with a satisfactory method is to hold the plants upside down under a tap of cold water, turned full on. The water brushes off most of the red spiders, green flies, and thrips, and leaves the plant looking much refreshed. The treatment should be repeated once or twice at intervals of a few days until there is no further sign of any pests.



[Douglas Elliott photo.]

The crimson flower spikes of the well-named bottlebrush plant (*Callistemon citrinus splendens*), borne on a shrub that grows up to 5 or 6 ft. high, make a very bright display in spring and early summer. The shrub will withstand wind, but cannot be grown in the colder districts.

Wool after Dark



DRESSES BY: LEFT—ANGELE DELANGHE.
CENTRE—AN AUSTRALIAN DESIGNER.
RIGHT—THE HOUSE OF VIOLET DALLEY.



DESIGNS BY: LEFT—VICTOR STIEBEL.
CENTRE—MERCIA. RIGHT—BAROQUE.

Fashions in Wool for Evening Wear

WOOL is the most versatile of all fabrics. From earliest times man has used it for protection against the elements, for being a pure animal fibre and unaffected by climatic change it is equally suitable for wear in tropical countries as in colder climes. Though it can be spun so finely as to produce diaphanous material of fairylike delicacy, it is extremely durable. In fact, a single wool fibre is actually as strong as a thread of gold of the same thickness and can be bent thousands of times without weakening; moreover, it will not break even when stretched up to 30 per cent. of its own length, but will return to normal after being released. Wool is non-inflammable, does not crush easily, and takes dye remarkably well. With its multiplicity of weaves and its variety of patterns and textures wool is in ever-increasing demand the world over. Small wonder that down through the ages it has always enjoyed a pre-eminent place among textiles.

AT present Australia, New Zealand, and South Africa supply three-quarters of world exports of fine clothing wool, and a wool board has been set up in each of the three Dominions to publicise and promote the use of wool, to assist scientific research into wool problems, and to watch over the welfare of the industry as a whole. The activities of the New Zealand Wool Board cover a wide field, one of its tasks being to aid the New Zealand Woollen Mills' Research Association in research projects to assist manufacturers in their use of New Zealand wool. Very little is heard about the technical workers engaged in this research, but the results they achieve are often of the greatest importance.

The overseas activities of the New Zealand Wool Board are conducted through the International Wool Secretariat, which operates from a head office in London. In most European countries it has consultative committees of local wool experts working with it, thus proving truly international in scope. This great organisation is owned by the growers of Australia, New Zealand, and South Africa, and periodically the representatives of the wool boards of these three countries meet in London to decide on the activities of the secretariat. From such a meeting Mr. N. R. Jameson, of Onga Onga, chairman of the New Zealand Wool Board, and Mr. W. Horrobin, of Waikanae, its vice-chairman, recently returned to New Zealand.

The New Zealand Wool Board's latest plan for popularising this valuable export of the Dominion was the presentation of a display of evening gowns in wool from the studios of the world's greatest designers. Modelled by a group of Wellington women who acted as amateur mannequins for the occasion, these beautiful gowns show what can be done today with wool both in the manufacture of gossamer-weight fabrics and in the realm of dress design.

Regal Distinction

Pride of place goes to the model by Norman Hartnell, designer to the Queen and Princess Elizabeth. (Last year he rose to further heights of fame in the fashion world with his loveliest of all creations, the Royal wedding dress — no fairy-tale princess was ever more exquisitely gowned than Princess Elizabeth on her bridal day.) From his choice of colour, a clear turquoise, for this evening model of wool crepe it would seem that Mr. Hartnell shares Her Majesty's preference for pastel tones. The model features a high, rounded neckline and kimono sleeves, the bodice falling into soft folds before being moulded to the midriff. The slim skirt is slit slightly in front and the deep-draped hip-swathe, fastened by four jewelled buttons, is embroidered with leaf-sprays of shimmering sequins and flowers of semi-precious stones. The same rich embroidery is repeated on the shoulders, giving the gown a truly regal distinction. (Modelled by Miss Elizabeth Entrican.)



[Photo News Ltd. photo]
The evening dress of wool crepe designed by Norman Hartnell.

Sophisticated Elegance

The Victor Stiebel dinner gown in fine black crepe fits closely to the figure and has enormous taffeta sleeves shaped like folded wings and shading from dark grey to delicate pearl. A spray of silken roses worn high on one shoulder is the sole adornment of the low-cut neckline. The severe oblong setting of the mannequin's long, jet ear pendants accentuates the sophisticated elegance of this frock, which formerly graced the collection shown by the South African Wool Board before the King and Queen during their tour of that country. (Mrs. A. A. Gedge.)

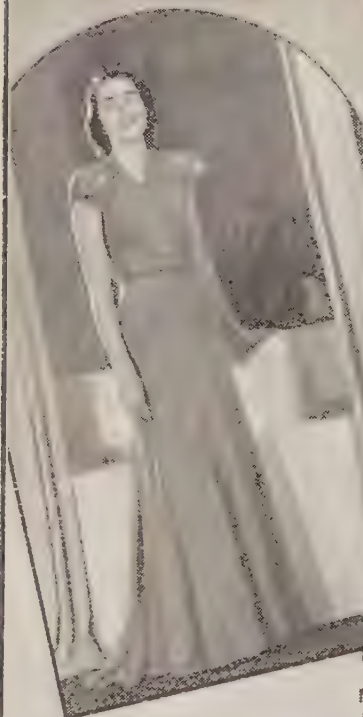
Reminiscent of Victorian Age

Violet Dalley uses a pleasing combination of print and plain wool crepe for her evening two-piece, the draped shoulder-line and long, slender bodice being reminiscent of the Victorian age. A further resemblance to the modes of that period is effected by a becoming drape of plain material above the beflowered skirt, which bestows a slight suggestion of a bustle. The accompanying jacket is a gay little affair of cherry red to match the broad band of colour at the bottom of the skirt. The wearer has only to don the jacket and her ball gown is at once transformed into a demure dinner dress. (Miss Patricia Beaumont.)

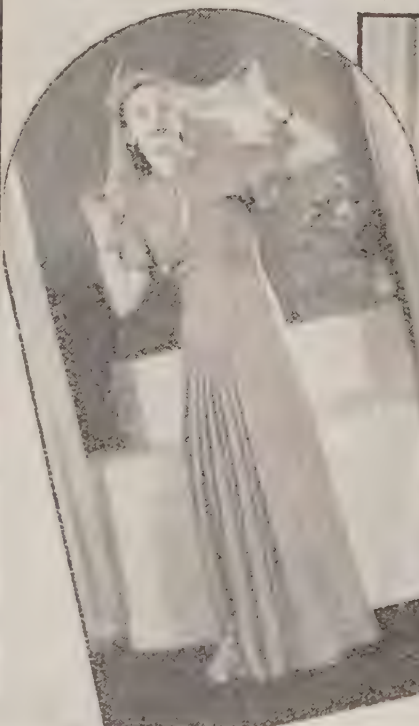
Striking Ball Gown

Rima, too, is represented by a strapless evening dress. The shirred bodice and pannier skirt are of mist-grey crepe. A glimmer of pearls at ears and throat, a bright emerald

Wool after Dark



MODELS BY: LEFT—WORTH. CENTRE—
AUSTRALIAN HOUSE. RIGHT—DORVILLE.



FROCKS BY: LEFT—MAUD KNOTT,
CENTRE—PETER RUSSELL. RIGHT—RIMA.

FASHIONS IN WOOL FOR EVENING WEAR

plume for the hair, and elbow-length gloves of emerald kid prove the perfect accessories for this striking ball gown in the grand tradition. (Miss Kathryn Mack.)

Picturesque Paisley Design

The Mercia model would enable any woman to dispense hospitality with a light heart. This handsome hostess gown of cashmere (like tie material) is the joyous yellow hue of English primroses in spring and is printed in a picturesque Paisley design. The small, upstanding collar is finished with two decorative buttons, the Paisley pattern being picked out in gold and dark-amber sequins on the three-quarter sleeves and sash ends, which tie in front. (Miss Berenice Burgess.)

Charming Finish

The bridesmaid's frock of powder-blue shown by Maud Knott, Ltd., is as romantic as a young girl's dream. A pointed panel enhances the simplicity of the softly-draped front and there is a tiny matching cape embroidered in silver. The curled-leaf motif of the cape embroidery is emphasised in the lightly-beaded coronet (designed by Hugh Skillon), which, divested of its short tulle veil, forms a charming finish to the frock for wear on other festive occasions. (Miss Alison Yates Jones.)

Study in Contrasts

The sage-green ensemble from the well-known house of Dorville reveals a study in contrasts, for it is carried out in two completely-different weights of wool. A super-light-weight worsted is used for the dress, the skirt fanning out into the most fascinating knife-pleats imaginable. The beautifully-tailored jacket with its three-quarter sleeves, high-buttoning revers, and brief, fitted basque is of fine velour. (Miss Margaret Archer.)

Intricately-pleated Skirt

Angele Delanghe is another designer who favours an intricately-pleated skirt for her model of dusty-pink wool crepe. The bodice is moulded to the figure and the waist-line is encircled by a narrow gilt chain. A smooth-flowing skirt drape, caught on either side of the two black tassels fastening the chain, falls low to the back. (Miss Wendy Cooke.)

Graceful, Sweeping Lines

The Worth dress of fine wool is also in pink, the deep-rosy flame of coral. All the fullness of the skirt is brought round to the back, which falls into graceful, sweeping lines. The cap sleeves sparkle with sequin embroidery and semi-precious stones, and a cut-out back adds to the attractiveness of the model. (Miss Susan Doughty.)

Cobwebby-fine Fabric

Peter Russell, among whose clients is the Duchess of Gloucester, has selected a floral-patterned fabric of such cobwebby fineness that a square yard weighs only 2oz. It is strengthened for weaving by a mixture of alginate rayon, made from seaweed, which is later washed out of the finished material, leaving only the pure wool. The designer has rendered the gown's lilac and cyclamen tonings even more beautiful by adding clusters of plastic discs which reflect little rainbows of light whenever the wearer moves. (Miss Elizabeth Tennent.)

Heavily-embroidered Sleeves

The hostess gown from Baroque, of London, has a wrap-over front and a wide sash looped to display a portion of its brilliant-green lining against the petunia wool of the gown. The dolman sleeves, tapering to a point at the wrists, are heavily embroidered with sprays of berries and foliage and starry-petalled, single dahlias in glorious shadings of autumnal mauves and purples. Similar blooms cascade down the ends of the sash. The hemline, which is raised just sufficiently high in front to show a silver-shod instep, curves gradually into a small, semi-circular train. (Mrs. A. R. Entrican.)

Elegant Formality

The Frederick Starke model features black wool crepe. Form-revealing, and with a fashionably-sophisticated, peg-topped skirt, the frock is cleverly belted and achieves the necessary fullness at the back by means of concealed pin tucks. A pearl clip fashioned in the form of vine leaves and grapes centres attention upon the deep V neckline.



[Photo News Ltd. photo.]
The Frederick Starke frock of black wool crepe.

There are smaller grape clusters for earrings, and the circlet for the hair consists of triple strands of seed pearls linked to a central medallion. Long, white gloves add the final touch of elegant formality to this superbly-styled gown. (Miss Mary-Annette Burgess.)

No fashion display is considered complete without a wedding group, and the honour of designing the bridal attire for this collection was accorded an Australian house. The bridal gown (Miss Jane Doughty) has a swathed bodice and heart-shaped neckline, and the soft folds of the skirt fall from a bow in front, the light wool material lending itself admirably to this graceful treatment. At the waist gold embroidery gleams like winter sunlight on the whiteness of the gown, but the long train is unadorned. Peter Robb, of Australia, designed the simple chaplet with its shoulder-length veil of tulle. The bridesmaid's dress (Miss Barbara Dentice) of sunset-pink wool is a replica of the bride's except for the train, and her unusual crescent-shaped hat decked with roses, forget-me-nots, and pink-tipped daisies is also a Peter Robb creation.

Feminine interest has always focused on fashion, but never more so in New Zealand than at present with the prospect of so many brilliant social functions ahead in connection with the Royal visit. The action of the New Zealand Wool Board, therefore, in arranging this display of exclusive models in wool from London's leading fashion houses is most opportune and will not only have a far-reaching effect on current style trends in this country, but also encourage the vogue for the more extensive use of those enchanting fine-wool fabrics which have been especially created for evening wear.

Packing Cooked Fruit



Upper left—Place the hot sterilised jars on a warm tray and fill them to overflowing with boiling fruit and syrup. Upper right—Wipe the rims of the jars free from fruit and syrup and slide the caps on. Middle left—Screw the lids on tightly and stand the jars upright to cool overnight. Middle right—When the jars are cold, unscrew the outer lids and test the seals by lifting each jar gently by the cap. Lower—Label the jars and store them in a cool place until the fruit is needed.

Using PRESERVING JARS with SELF-SEALING LIDS

By EVELYN E. MOORE, Rural Sociologist,
Department of Agriculture, Auckland.

SELF-SEALING lids for preserving jars, though they have been in use for several years, do not seem to have attained the popularity accorded the old type of lid. Many women have found these vacuum-seal lids less reliable, especially with labour-saving and formerly-successful methods which they have attempted to use under the new conditions.

AS a different scientific principle is involved in the construction of these lids, they will not preserve food successfully under all the conditions which were formerly satisfactory. The screw-top type produced a seal by the tightness with which the rim was screwed down on the rubber, so that, as long as the food in the jar was sterile when the lid was screwed down, it did not deteriorate.

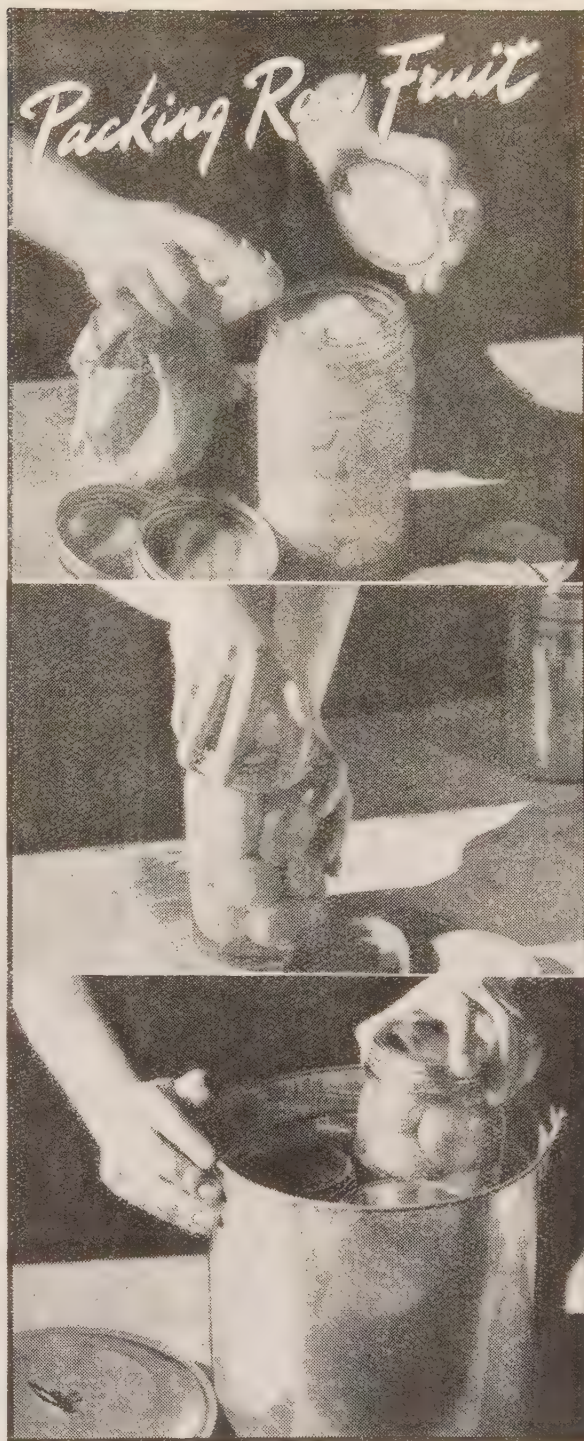
Formation of Vacuum

The self-sealing lids rely on the formation inside the jar of a vacuum which draws down the inner cap so firmly that an airtight seal is formed. Experiments have shown that the boiling water-bath method of processing gives the most reliable results with these lids, which have a valve-like action. When the pressure from the steam formed in the jar during processing becomes sufficiently high they allow it to escape, but they prevent the entrance of air or water from outside as the jar cools and the steam condenses, so forming a vacuum. A space of about $\frac{1}{4}$ in. at the top of the jar should be left for the formation of a satisfactory vacuum and as a safeguard against small particles of food or syrup getting between the rim and the jar and so spoiling this vacuum.

Successful results are also possible using the method by which the food is cooked and poured into the heated sterilised jars (the hot pack). With this method it is essential that the jars should be filled to overflowing with the boiling fruit and syrup, the rims wiped free of syrup, and the cap and lid rapidly screwed on. The vacuum is formed by the contraction of the syrup as it cools in the jar. Unless the food is boiling, a satisfactory vacuum may not form.

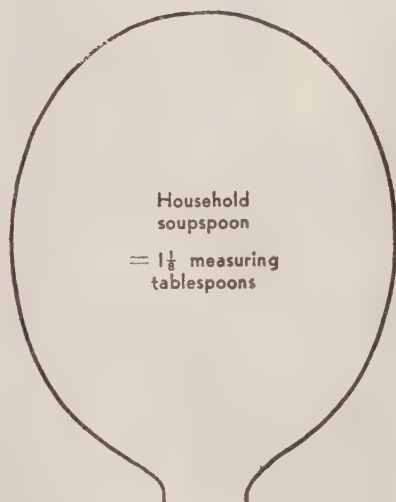
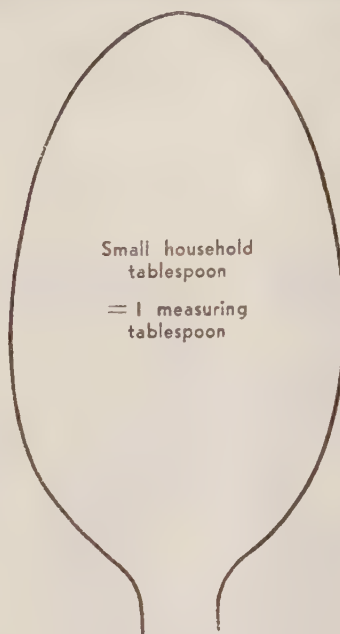
Ensuring a Perfect Seal

As the inner caps have less elasticity than the old rubber bands, a very smooth surface is necessary for the formation of a perfect seal. Therefore the top edge of the jar should be wiped carefully, jars with uneven top surfaces should be discarded, and jars should be left upright and not bumped or the vacuum will be broken. It is often necessary to process foods for longer than formerly, as even small amounts of undestroyed enzymes may produce some gas inside the jar and so cause the seal to be broken.

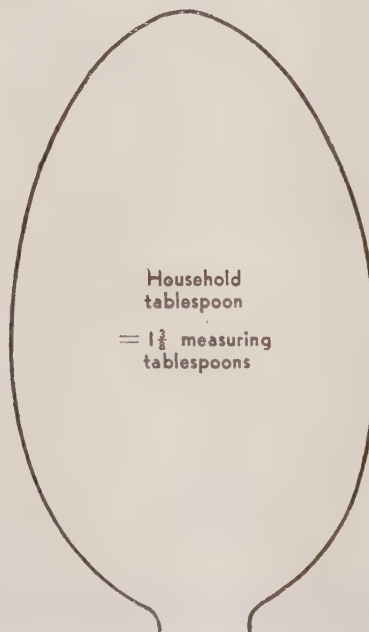
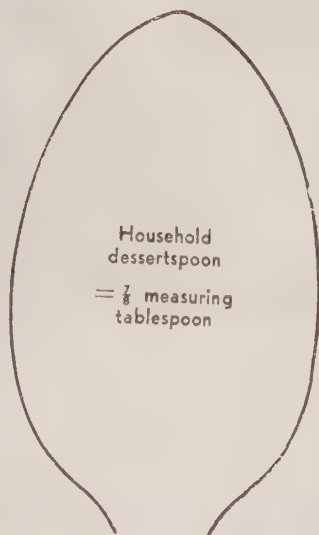


Upper—Leave a space of about $\frac{1}{4}$ in. at the top of the jar before processing the fruit. Wipe the rim of the jar before placing the cap in position as a safeguard against small particles of food getting between the rim and the jar and so spoiling the vacuum. Middle—Screw the lid on firmly before processing. Lower—Ensure that the water covers the lids of the jars during processing. It will not enter the jar and spoil the seal, and ensures that the fruit will be sterilised.

TESTING THE CAPACITIES OF HOUSEHOLD SPOONS

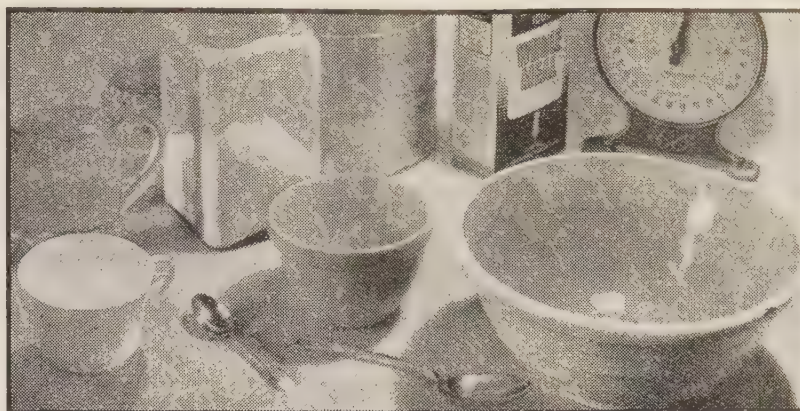


These diagrams were made by drawing round the original spoons, so a spoon should be checked by laying it on the diagram and viewing it from above. If it corresponds, the line will be just visible all round it.



Testing Capacities of Cups and Spoons

UNTIL recently standard kitchen measurers have been difficult to obtain, and even now few are on the market and unfortunately they have increased in price. In this article Eirene Unwin, Rural Sociologist, Department of Agriculture, Dunedin, explains how to test the capacities of household spoons and cups and so obtain standard measurements without the expense of and with only a little less convenience than with the standard measurers.



[Sparrow Industrial Pictures Ltd. photo.]

FOLLOWING are some suggestions for checking the capacities of cups and spoons:—

Cups

The standard measuring cup contains $2\frac{5}{8}$ pint or 8oz. of liquid. It has the same capacity as the newer slanting-sided New Zealand-made yellow cups, so if one of these is available, it can be kept for use as a measuring cup.

If this type of cup is not in use, here are some easy ways to discover whether any cup contains 8oz.:—

Using a balance.—If the 1lb. or $\frac{1}{2}$ lb.

weight is missing, use 1lb. of factory butter as a counter-weight. Weigh out exactly $\frac{1}{2}$ lb. of sugar (or 1lb. if checking against butter) and pour it into the cup being tested. Do not pack it in, as cooking ingredients are not usually packed into the measurer. If the cup can be filled level with the 8oz., it is a standard-sized cup.

Using a baby's feeding bottle.—Fill the bottle to the 8oz. mark with water and pour this into the cup being tested. If the water fills the cup so full that another few drops would make it overflow, the cup is of standard size.

Using a pint measurer.—A standard cup filled five times is equivalent to 2 pints—that is, 1 pint equals $2\frac{1}{2}$ cups. As an exact half-cup is difficult to measure, it is best to fill the pint measure twice and see if the whole quart exactly fills the cup five times.

Using a jelly glass.—A brown jelly glass with sloping sides (available in shops at present) holds exactly 4oz. of sugar or liquid—half a standard cup.

Flour is lighter than sugar and a cupful weighs from 4 to 6oz., depending on how closely it is packed. A cupful of flour which has been sifted into a bowl should weigh exactly 4oz.

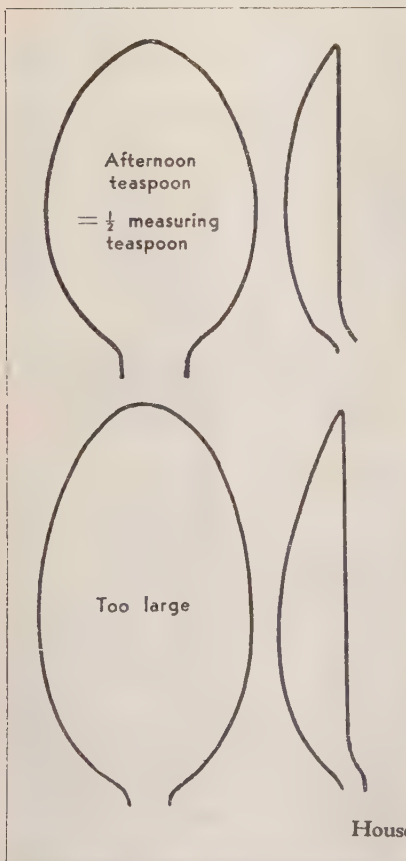
Spoons

Household spoons vary greatly in

capacity, and it is difficult to be sure that any but a standard measuring spoon is really accurate, but the diagrams indicate the sizes of typical household spoons and their equivalents in standard sizes. Each diagram was made by drawing round the original spoons, so when another spoon is checked against it the line should be just visible all round the spoon, whether it is held flat or on edge. It is important to check both the shape and the depth, as a very small difference in the depth of the spoon makes a considerable difference to the amount it will hold.

Once a spoon has been checked, all measurements should be level, the spoon being filled and scraped off once with the back of a knife. A heaped or "rounded" spoonful can be equal to two or three times the same spoonful measured level. Liquid should be measured with the spoon as full as possible without spilling.

Once a standard tablespoon and teaspoon have been found among the household spoons, mark them in some way and always use them in future. Or, if all this checking sounds too complicated, buy a set of plastic measuring spoons on the next visit to town; they are not expensive.



Household teaspoons compared with a measuring teaspoon.

The Care and Use of a Sewing Machine

THE home dressmaker, with limited time at her disposal, is tempted to begin sewing without spending time checking the machine, but knowing how to care for the machine and how to get the best results from its use will save time in the long run, and more satisfaction will be gained by turning out successful garments with a minimum of effort. In this article Edith G. McNab, Rural Sociologist, Department of Agriculture, Dunedin, gives advice on the care of a machine and the development of good sewing technique by a beginner.

KEEPING the machine clean and oiled is of the greatest importance. Machines which have stood useless for years have been known to sew perfectly when cleaned and oiled. If a machine works heavily, the cause is likely to be a lack of oil and an accumulation of fluff and dirt between the moving parts. Usually the instruction booklet provided by the makers of the machine shows diagrams of its parts, and it is wise to study the diagrams before beginning cleaning and oiling to find out which parts require particular attention and how to remove face-plates to gain access to the mechanism.

Turn back the head of the machine to reach the parts underneath. First clear away all lint and dirt, using a soft duster and a brush with bristles which are not too hard. In some makes of machines there may be a small piece of oily felt near the shuttle; do not remove it with the fluff.

Lubrication

If the machine seems to be gummed up by old, inferior oil, wash all the



[National Publicity Studios photo.]
In secondary schools where sewing is part of the curriculum girls are instructed in the care and use of sewing machines.

moving parts by brushing them with kerosene. A few turns of the driving wheel will help to work the kerosene, and later the oil, into inaccessible parts. After cleaning, oil the machine with the grade recommended by the makers. Good-quality separator oil or light-grade machine oil may be available on the farm if no special sewing machine oil is at hand. Refer to the instruction booklet to find all the oil holes, and in addition oil all parts which move against another part. Do not overlook the bobbin-winder and moving parts of the treadle.

A drop or two of oil in each place is sufficient. Especially avoid too much oil on the presser bar and needle bar and around the shuttle. Most shuttles

are best wiped with an oily cloth instead of having the oil applied direct; it reduces the risk of oil reaching the sewing thread.

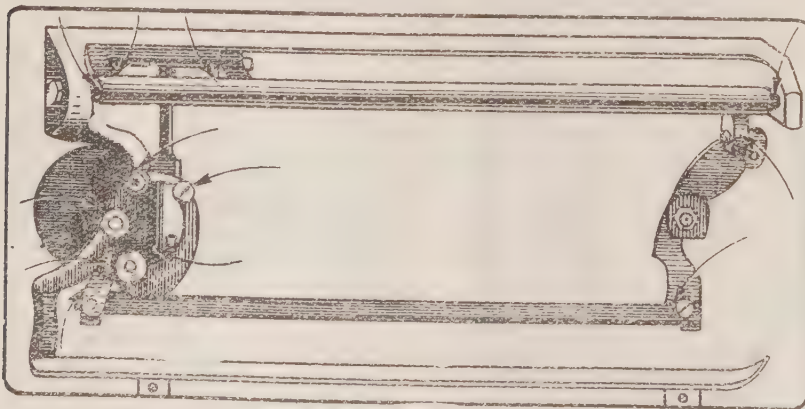
Run the machine quickly, unthreaded, for a minute or so after oiling it to ensure penetration. When oiling is complete wipe off all excess oil, replace all plates, and screw them into position firmly. Run a clean duster under the presser foot (with no thread in the needle) so that no oil is left on the feed dog, presser foot, or needle to soil the next article to be sewn. Avoid getting oil on the driving belt or on any rubber parts.

If the machine is in daily use, oil it each day. If it is used infrequently, an occasional oiling will suffice. Leave the machine covered when it is not in use.

Management of the Machine

If the machine is a treadle one, learn to treadle before attempting to sew. Choose a chair of comfortable height so that the shoulders do not have to be held unnaturally high when the hands are raised to work at the machine, and so that the feet rest easily on the treadle. There is no definite rule about the placing of the feet on the treadle; many women find that the one foot is best placed toward the back of the treadle and the other foot on the front. While first practising treadling, the needle bar can be put out of action by turning the knob or lever at the centre of the balance wheel; the manufacturer's booklet will show how to do this.

Before starting a treadle machine see that the driving belt is in position



A diagram of a sewing machine with the head turned back. The arrows indicate moving parts which should be oiled.

on the flywheel and the balance wheel. Turn the balance wheel by drawing the rim forward with the palm of the right hand, but do not tangle the fingers in the spokes of the wheel. Keep turning by hand until the feet can take up the treadling action, one foot after the other, to keep the wheel turning steadily. Avoid jerky treadling. Do not let the wheel turn backwards; when the needle is threaded a run backwards breaks the thread. (Most balance wheels turn toward the operator, but in a few makes the wheel may turn the other way.)

When the treadling action is smooth and the speed can be regulated, put the needle bar in gear again, but leave the needle unthreaded. Place a piece of paper under the presser foot, let the foot down, and try treadling again, guiding the piece of paper with one or both hands without pushing or pulling. Try following straight and curved lines with the needle perforations until the lines can be followed exactly.

This is a good time to try varying the length of the stitch. Refer to the instruction booklet again. A knob or lever is provided for changing the length of the stitch.

Also try turning sharp corners. Rule two intersecting lines on the paper. Approach the corner by following one line and, as the corner draws near,

CARE AND USE OF A SEWING MACHINE

ADJUSTING TENSION OF THREAD



The upper thread is too loose. It should be tightened a little at a time until it draws the bobbin thread up into the material.

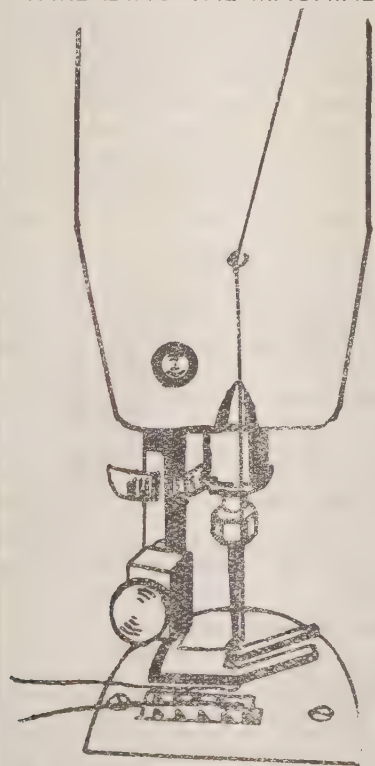


The upper thread is too tight and the tension should be loosened.



Good tension. The stitches lock between the layers of material.

THREADING THE MACHINE



The machine threaded with the foot in position ready for insertion of the material. The thread from the needle has been brought down between the points of the foot, and both threads have been pushed back.

slow the machine, turning the balance wheel by hand for the last stitch or two if necessary. Stop when the needle is at its lowest point in the paper, raise the presser foot, and use the needle as a pivot round which to turn the paper. When the paper is in the right position for stitching along the second line lower the presser foot and continue. Use the same method when turning a corner on fabric.

Electric Machines

The management of electric sewing machines is much the same except that speed is regulated by the motor instead of by the rate of treadling. Either foot or knee control may be provided. Many people prefer foot control, as the sideways pressure of the knee when using a knee control is tiring if much sewing is done. In either case the speed is regulated by the pressure—the more pressure, the greater the speed.

Beginners sometimes find difficulty in obtaining slow speeds with electric machines. Practising on paper without thread in the needle will help to overcome this. If the speed cannot be reduced sufficiently to avoid over-running a corner, stop the motor when approaching the corner and turn the wheel by hand to make the last stitch or two.

Care of the electric motor should be left to an electrician.

Threading the Machine

The method of threading the machine varies with the make. Either the agent or the instruction booklet will show how the threading is to be done, and following the correct method is most important, for a slight mistake may mean that the machine will not form the stitches properly.

The bobbin threading must also be done as recommended by the makers, and the bobbin must be inserted cor-

rectly. Before beginning to sew, bring the bobbin thread up through the needle hole by holding the end of the needle thread slackly and turning the wheel to send the needle down and up again. Then a gentle pull on the needle thread will bring up the bobbin thread. (In some machines it is necessary to lower the presser foot to pick up the bobbin thread.) Push both threads to the rear, passing the needle thread between the two prongs of the presser foot. Placing the ends in this position will avoid having them tangle in the first inch or so of stitching.

The length of the ends of thread to be left depends on the make of machine.

Ends which are too short will be pulled under the needle plate, or the thread will pull out of the needle. Experience will soon show how much thread must be left. If a habit is made of stopping the machine when the needle is at its highest point, there is less risk of the thread pulling out of the needle and the needle is in the correct position for restarting.

In several makes the presser foot must be raised to release the tension before a length of thread can be drawn out to be cut at the end of a row of stitching. Always pull the threads from behind the presser foot, with the needle thread between its prongs, so that the pulling puts no strain on the needle. Many broken needles result from pulling the threads sideways or toward the sewer. Use the cutter on the presser bar or have scissors handy to cut the thread.

Thread Tension

The tension on the thread regulates the amount of thread freed to make each lock stitch. The two threads should lock in the centre, between the pieces of material being joined.

Different kinds of fabric require different degrees of tension. Generally heavy materials need more tension on

CARE AND USE OF A SEWING MACHINE . . .

the sewing threads than light fabrics. Very light tension is desirable for sheer fabrics such as voiles and georgettes and when sewing bias seams. (Plan ahead and hang anything cut on the bias for at least a day before sewing so that it stretches before being stitched.)

The home dressmaker knows what thickness of material was stitched last, and no adjustment of the tension is required if fabric of the same weight is to be sewn, but a different thickness of thread or material makes a change of tension desirable. If in doubt, try out the stitching on doubled scraps of the material to be sewn and make sure the tension is correct before beginning on the garment. The tension on the bobbin thread rarely needs to be altered, and it is best for the beginner to leave it alone.

Usually either a screw or a lever is provided for altering the tension on the upper thread. If the upper thread lies on the surface of the material and is not drawn in to make the lock stitch

between the two pieces of material, the upper tension is too tight; loosen it a little, try the stitching again, and keep on doing this until good tension is secured.

If the thread from the bobbin lies on the lower surface of the material, the upper tension is too loose; tighten it a little at a time, trying out the stitching after each alteration, until the threads lock in the centre of the material.

Too much tension will cause dragging and puckering of the seam, and the seam will wear badly. The thread will break because it is too tight compared with the fabric. Too little tension may cause looping of the stitches and the pieces of material will not be joined together satisfactorily. (There are other causes of looping of the threads—for example, incorrect threading.)

For special purposes good tension is not necessarily desirable. If gathering is to be done by machine, it is easier to draw the threads up if the

thread to be pulled is slightly tighter than the other. For gathering, the largest stitch should be used.

Choice of Needle and Thread

Keep a supply of needles of varying sizes and, if possible, of the correct make for the machine. If the make of needle required is not obtainable, take one of the old needles when shopping and compare the needles available with it for length, shape of the shank, and grooving on both sides. When changing needles test the position of the new one by turning the wheel slowly to see that it enters the needle hole right in the centre. Make sure the thumb-screw is tightened securely so that vibration will not loosen the needle.

The needle must not be bent. Test it for straightness by placing it, flat side of the shank down, on one of the flat metal surfaces of the machine and comparing it with the flat surface at eye level. Keep needles sharp; a small sharpening stone is supplied with some machines.

The size of the needle and thread depends on the thickness of the material to be stitched. For heavy materials use a thick needle and strong thread; for light materials choose a fine needle and fine thread. Clumsy seams result if thick thread is used on lightweight material. Recommendations for needle sizes cannot be given, as size numbers are not standardised, but a guide for choice of thread follows. The instruction booklet with the machine usually provides a list of needle and thread sizes for particular weights of fabric. The length of the stitch must be varied to suit the material, heavy cloth requiring a longer stitch than fine cloth.

Material to be stitched	Size of thread.
Very thin muslin, linen	100 to 150 cotton
Fine linen, fine shirtings, fine silks	80 to 100 cotton 24 to 30 silk
Shirtings, sheetings, general work	60 to 80 cotton 20 silk
Heavy cottons and silks, light woollens	40 to 60 cotton 16 to 18 silk
Tickings, woollens, trousers	30 to 40 cotton 10 to 12 silk
Heavy woollens, heavy clothing generally, bags	24 to 30 cotton 60 to 80 linen
Very heavy goods	40 to 60 linen

The finer threads have been difficult to obtain, but they will be available again.

Use of Attachments

Little can be written about machine attachments, as details vary with different makes. Most of the attachments are time savers. If sheets and towels are hemmed at home, the hemmers will be specially useful, for they turn in a raw edge automatically as the stitching is in progress. Tucking and frilling are more quickly done by using the appropriate attachments.

If the different sewing feet have not been used before, a little preliminary practice on easily-handled material soon teaches easy management.

A GAY CUSHION COVER



Gay, hard-wearing, and simple to make, this attractive cushion cover can be made from canvas and embroidered with oddments of wool. All that is needed is a length of canvas to fit the cushion and a cord and tassels for trimming. Work large and small lazy daisies in varying shades and thicknesses of wool across the surface as shown. Work a cluster of large lazy daisies in each of two opposite corners and smaller ones in the two remaining corners. When the lazy daisies are completed work seed stitch over the remainder of the cushion. Sew three sides together on the wrong side, turn right side out, then turn in the edges of the open end. Trim with cord and tassels if desired.



DRIED fruits have always been popular with the housewife, both as a substitute for fresh or bottled fruits and for their own special qualities of concentrated flavour and sweetness. As ingredients for puddings, pies, and cakes, as part of a sweet dessert, or as a breakfast fruit, dried fruits are most useful in winter, but they are always good to include in lunches or to give children in place of sweets. This article by Norma K. Metson, Rural Sociologist, Department of Agriculture, Wellington, describes methods of cooking these fruits, giving standard recipes for their use and some more elaborate ones for special occasions.

THOUGH still expensive, dried fruits are now more plentiful in the shops, and they may even be home produced, as fruits can be dried quite easily in the sun, in a cool oven, or in a specially-constructed drier. In this way apples, peaches, pears, apricots, plums, and berries can be stored during winter and surplus crops conserved without the sugar which is necessary for bottling or jam making. Dried apples, recently introduced to the New Zealand market to tide over the period when no fresh or cool-store supplies are available, have been popular for some purposes; the housewife certainly appreciates being able to make a pie without the labour of peeling and coring the apples.

The larger fruits, such as pears, apples, apricots, and peaches, when dried are used mainly as substitutes for the fresh fruits; prunes, though they are a dried fruit, are not regarded in the same way; and the smaller fruits—dates, raisins, currants, sultanas, and figs—are so frequently included in cakes and puddings in their dried form that they are seldom thought of in any other way. Two relatively-new commodities are dried bananas and dried cranberries. The bananas, a product of Western Samoa, are rather similar to dates in sweetness

and texture, but their distinctive flavour is well preserved. Cranberries, which come from the United States, are small berries used to make a red jelly or sauce which is usually served with poultry.

Standard Methods of Cooking

If they are not cooked correctly, dried fruits can be very unpleasant to eat, and that is doubtless why many people are prejudiced against them. Distasteful characteristics sometimes found are grittiness, which can be eliminated by thorough preliminary washing, toughness, which is caused by insufficient soaking or too rapid cooking, and mushiness, if the fruit is oversoaked or cooked for too long. Another mistake often made is the addition of too much sugar. When fruits are dried, water is eliminated and the natural sugars present become more concentrated. Some of the water is returned during soaking and cooking, but the sugar concentration is still higher than in the fresh fruit, so less need be added. Prunes particularly require little sugar, and the addition of a few slices of lemon to the water in which they are cooked will improve their flavour greatly. Sugar is best added to the fruit just before cooking is completed, as its sweetening power is then utilised more fully.

Thorough washing of dried fruits before they are cooked is essential.

Dried fruits can be cooked without previous soaking if plenty of water is used and they are stewed for 30 to 45 minutes in a saucepan with the lid on. A better product and a saving of time and fuel will result if the fruit, after being washed, is covered with water and left to soak for 24 hours. Use the soaking water to cook the fruit; if most of it has been absorbed, a little more water may be necessary. Cook the fruit in a covered saucepan until it is tender; 10 to 15 minutes' gentle boiling will be required. Two or three minutes before cooking is completed add sugar to taste—about $\frac{1}{2}$ tablespoon to each person, or $\frac{1}{4}$ cup to 1lb. of fruit. Dried apples should be cooked in accordance with the directions on the packet in which they are bought.

Basic Recipes

Any type of dried fruit may be used in the three following recipes:—

Fruit Whip

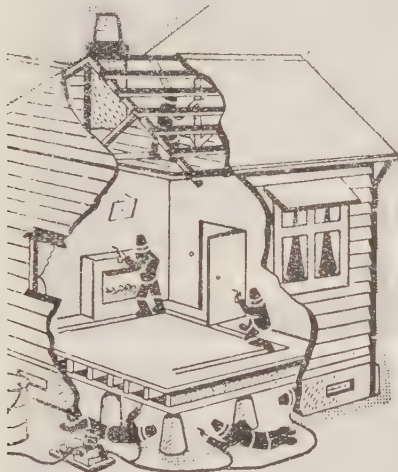
Fruit whip with custard (illustrated at the head of this article) is an appetising light dessert. Here is the recipe:

1 tablespoon of gelatine	2 egg whites
1 cup of water	$\frac{1}{2}$ cup of sugar
$\frac{1}{2}$ cup of fruit juice	1 tablespoon of lemon juice
1 cup of fruit pulp	

Soak and cook the dried fruit, strain off the juice, and, if necessary, make it up to $\frac{3}{4}$ cup with hot water. Pulp the fruit by thorough mashing or, preferably, put it through a strainer. Soak the gelatine in water, add the sugar, and dissolve both in the hot fruit juice. Add the fruit pulp and put the bowl in a cool place until the liquid is almost setting. Add the lemon juice,

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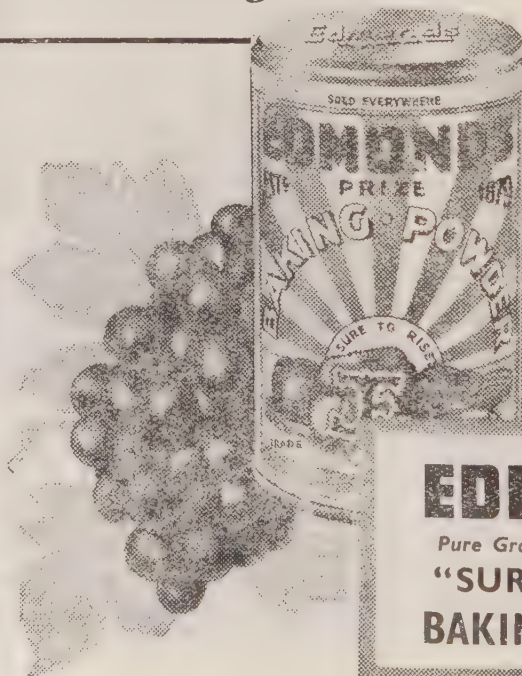
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and beat the mixture well until it is thick and fluffy. Fold in the stiffly-beaten egg whites, and pile the whip in a bowl or individual dishes. Serve it with a vanilla custard thickened with the yolks of the eggs.

Fruit Betty

Soak and partially cook dried fruit and place it in a greased pie dish in alternate layers with a mixture made in the proportions of 1-3 cup of sugar, $\frac{1}{2}$ teaspoon of cinnamon, and 1 cup of stale breadcrumbs. Dot each layer with a portion of two tablespoons of butter. Pour over it $\frac{1}{4}$ cup of fruit juice, and end with a layer of the crumb mixture. Cover the dish and bake the pudding for 35 minutes at 350 degrees F. Remove the cover and brown the pudding before serving it.

Upside-down Pudding

Grease a baking tin and cover the bottom with a layer of cooked dried fruits; prunes and apricots are particularly suitable. Sprinkle them with 2 tablespoons of brown sugar, 1 teaspoon of butter, and 1 teaspoon of lemon juice. Cover them with a batter made as follows:

$\frac{1}{2}$ cup of sugar	1 cup of flour
$\frac{1}{4}$ cup of fat	1 teaspoon of baking powder
1 egg	$\frac{1}{4}$ teaspoon of salt
1 teaspoon of vanilla	
$\frac{1}{4}$ cup of milk	

Cream the sugar and fat, then add the vanilla and the egg well beaten. Mix in the sifted dry ingredients alternately with the milk. Bake the pudding for 1 hour at 350 degrees, turn it on to a plate, and serve it fruit side up.

Additional Recipes

Date Loaf

1 cup of dates	1 teaspoon of vanilla
2oz. of butter	2 cups of flour
1 cup of sugar	1 teaspoon of soda
1 egg	$\frac{1}{2}$ cup of water

Soak the dates in the water for an hour before using them. Cream the

butter and sugar, then add the vanilla and beaten egg. Dissolve the soda in the date and water mixture, and add this alternately with the flour. Bake the loaf for $1\frac{1}{2}$ hours at 350 degrees in a billy with the lid on or in a tin covered with an enamel plate.

Banana Loaf

$\frac{1}{2}$ lb. of dried bananas	$\frac{1}{2}$ cup of sugar
$\frac{1}{2}$ cup of boiling water	1 cup of flour
1 dessertspoon of butter	$\frac{1}{2}$ teaspoon of soda
1 egg	Pinch of salt

Chop the bananas and mix them with the boiling water and butter.

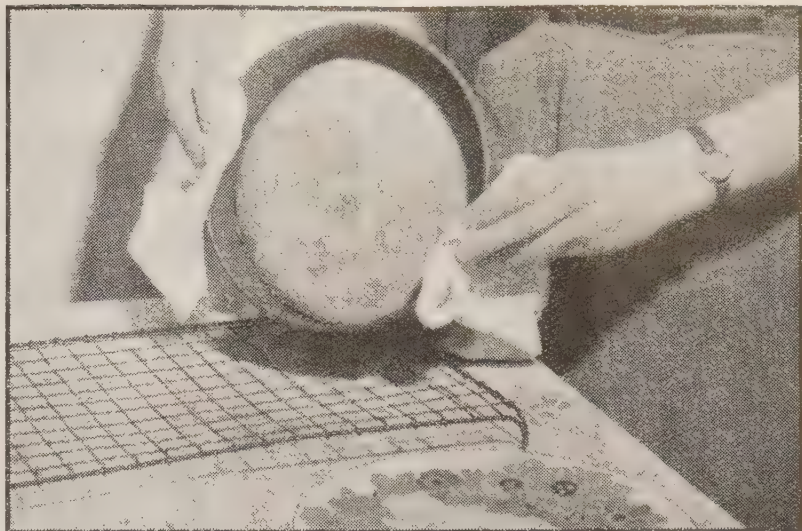
Beat the egg and sugar well together and add them to the fruit mixture. Add the flour and salt and the soda dissolved in 1 tablespoon of warm water. Bake at 300 degrees for 45 minutes.

Canadian Date Cake

$\frac{1}{2}$ cup of dates	$\frac{1}{2}$ lb. of butter
$\frac{1}{2}$ cup of sugar	$\frac{1}{2}$ cup of water
$\frac{1}{2}$ cup of walnuts	1 teaspoon of soda
$1\frac{1}{2}$ cups of flour	1 egg

Soak the dates in water before using them. Cream the butter and sugar and add the well-beaten egg. Dissolve the soda in the date and water

COOKING WITH DRIED FRUITS



[Photo News Ltd. photo.]

Prune upside-down pudding as it comes from the oven.



[Photo News Ltd. photo.]

Upside-down pudding being served.

COOKING WITH DRIED FRUITS



Banana loaf makes use of a new product—dried bananas.

[Photo News Ltd. photo.]

mixture and add this alternately with the flour and nuts. Bake the cake at 375 to 400 degrees for 45 minutes. Ice it with plain white icing and decorate it with chopped dates and walnuts. Walnuts may be omitted from the recipe if desired.

Prune and Nut or Apricot and Raisin Foldovers

Make a plain scone dough, roll it out $\frac{1}{4}$ in. thick, cut it into 3 in. rounds, and brush them with melted butter. On each round place a cooked prune with the stone removed and replaced by a piece of walnut, or a cooked dried apricot stuffed with two raisins. Sprinkle them with a little brown sugar, fold the dough, and press the edges together. Brush the foldovers with milk or melted butter, sprinkle them with a little sugar, place them on a cold greased tray, and cook them for 10 minutes at 450 degrees.

Russian Pie

1 cup of fruit juice or water	2oz. of nuts
1 apple	3oz. of dates
1oz. of mixed peel	3oz. of raisins
	$\frac{1}{2}$ oz. of cornflour

Cook the apple in the fruit juice, then add the fruit and, if desired, nuts, and simmer the mixture gently for 5 minutes. Thicken it with the cornflour and cook it again for 5 minutes. Use it as a filling for a previously-cooked pastry pie shell or for small tarts.

Bumble Bees

For these popular confections use any combination of dried fruits. Raisins, sultanas, and currants can be left whole; dates, prunes, and bananas should be chopped or minced. Bind the mixture with sweetened condensed milk, form it into balls the size of walnuts, and roll the balls in desiccated

coconut. Dry them out for about half an hour in a cool oven and store them in an airtight tin.

A similar mixture of fruits, minced or chopped and sprinkled with lemon juice, is delicious for sandwich fillings or for inclusion in an individual salad.

Dried Apricot Jam

2lb. of dried apricots	6lb. of sugar
2 quarts of water	Almonds
2 lemons	

Soak the apricots for an hour, wash them well, and cut them up. Cover them with the cold water and let them stand for three days. Cook the fruit, then add the sugar, and boil the mixture for 20 minutes. Add the chopped almonds and the juice of the lemons. Take the jam off the heat and bottle it.

Stuffed prunes are really party delicacies, as soaking, cooking, stoning, and stuffing them take time. Peanut butter and cream cheese are two suitable fillings. Prunes, soaked, stoned, rolled in a small piece of bacon, secured with a toothpick, and cooked in a hot oven for 10 to 15 minutes, are very popular as a savoury.

Dried bananas can be used in the same way as dates—in scones, to add interest to baked apples, bread puddings, jellies, or apple shortcake, and in cakes and steamed puddings.

Several types of raisins are obtainable—the familiar dark brown, slightly-sticky, "seeded" variety which is excellent for cakes and puddings; a smaller, purple, seedless kind more like a sultana; and the large muscatel clusters, delicious to eat as they are, but expensive and unsuitable for cooking, as they are complete with seeds.

Care of Paint Brushes

AS good paint brushes are expensive today, care of them after use is well worth while. If a brush is to be used again within a short period, it may be left standing in water to prevent the paint drying on the bristles, and when it is required again the water can be worked out before painting is recommenced. On the other hand, if a brush is not going to be used again for an indefinite time, it should be washed out. Turpentine may be used for this purpose, but several changes are needed, and as it is expensive for this use, even if kept for re-use, the following method is recommended: Give the brush a preliminary wash in a little turpentine and then wash it

with ordinary soap and warm water, renewing the soap and water as required, and working the brush about until all the paint is removed. Do not bend the bristles back. Rinse the brush two or three times in fresh, warm water, and hang it up to dry with the bristles hanging downward so that the water drips out. Brushes are better stored in a hanging position or lying flat; the bristles are soon damaged if a brush is allowed to stand in a pot for a long period with the whole weight on the bristles.

—EDITH G. McNAB,
Rural Sociologist, Dunedin.

Pattern for a Knitted Bedjacket

A STITCH giving a firm fabric pattern which does not readily stretch or sag has been used for the bedjacket described in this article by Eva Topping, Rural Sociologist, Department of Agriculture, Auckland. The garment will retain its shape even if worn frequently, so it is especially suitable for an invalid or convalescent who has to spend many hours in bed.

THE jacket fits closely at the neck and has long sleeves for warmth. The armholes are a little larger than usual, this extra width giving more comfort in wear. The front openings are bound with satin, stitched on over the edges of the knitting, enabling the jacket to be closed with dress fasteners which will remain secure. Button-holes tend to become larger, and then the buttons slip out if the wearer is restless.

The original was worked in pale apple-blossom pink wool, matched exactly by the satin trimmings.

Measurements: 35in. round bust when fastened; 19in. from shoulder to lower edge.

Abbreviations: k. knit, p. purl, st. stitch, dec. decrease, inc. increase, tog. together.

Tension: 13sts. in the pattern to 2in.

Materials: 10oz. of 4-ply wool; $\frac{1}{4}$ yard of 40in. satin to match the wool; a reel of stitching silk; dress fasteners; two or three small fancy buttons; 1 pair of No. 12 needles; 1 pair of No. 7 needles.

The Pattern

First row (right side): * Miss the first st.; k. the second st., then draw it over the first st. and off the needle. K. the first st. in the usual way. Repeat from * to the end of the row.

Second row: Purl.

Third row: K. * Miss the second st.; k. the next st., then draw it over the missed st. and take it off the needle. K. the missed st. in the usual way. Repeat from * to the last st. but one; k. 1.

Fourth row: Purl.

The Back

Cast on 112 sts. on No. 12 needles, and work in k. 1 p. 1 rib for 2in. Change to No. 7 needles and work 1 row plain. Work in the pattern until the back measures 12in.

Shaping for armholes: Cast off 5 sts. at the beginning of the next 4 rows (92 sts.), then k. 2 tog. at each end of every row until 76 sts. remain. Continue knitting in pattern until the work measures 8in. from the beginning of the armhole decreasing.

Shaping for shoulders: Cast off 10 sts. at the beginning of the next 6 rows. Cast off the remaining sts. across the back of the neck.



[Sparrow Industrial Pictures Ltd. photo.]

Right Front

With No. 12 needles cast on 60 sts. and knit in k. 1 p. 1 rib for 2in. Change to No. 7 needles and knit 1 row plain. Work in pattern until the work measures 12in. from the lower edge.

Shaping for armholes: On a purl row (that is, with the wrong side facing the worker) cast off 5 sts. at the beginning of the row. Knit the next row in pattern. Cast off 5 sts. at the beginning of the next p. row (50 sts.). Still knitting in pattern, k. 2 tog. at the beginning of each p. row until 40 sts. remain. Continue on these sts. until the front edge measures 17in.

Shaping the neck: Cast off 6 sts. at the neck edge of the next pattern row; work for 2in., decreasing 1 st. at the neck edge until 30 sts. remain, then continuing without further decreases.

Shaping the shoulders: Cast off 10 sts. at the beginning of the next three rows.

Left Front

Work the left front as for the right as far as the armhole shaping, then, on a knitted pattern row (that is, with the right side of the jacket facing the worker), cast off as at the right front. Work the neck edge and shoulder shaping in the same way.

The Sleeves

With No. 7 needles cast on 60 sts. K. 1 row, then work in pattern, inc.

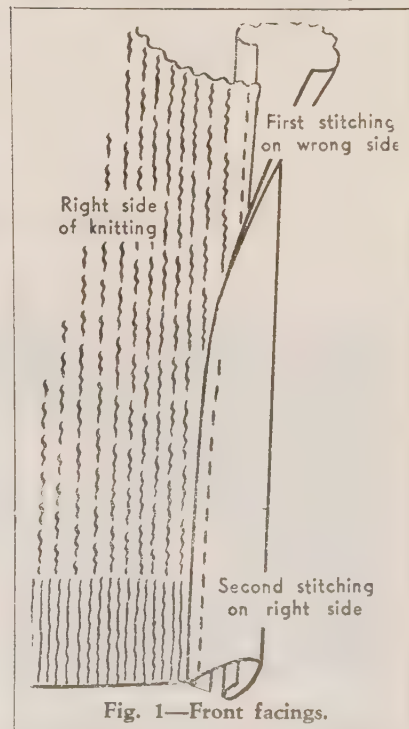


Fig. 1—Front facings.

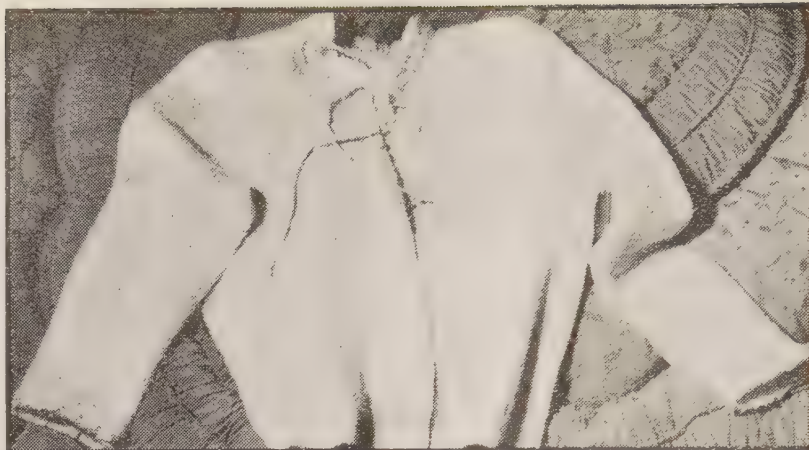
KNITTED BEDJACKET . . .

1 st. at each end of the seventh row and in every sixth row after until there are 80 sts. on the needle. Work until the side edge (for the arm seam) measures 15in. If the sleeve is needed longer, continue working without increasing until it is the required length.

Shaping the sleeve top: Decrease 1 st. at each end of the next row, then at each end of every third row 16 times (46 sts.). Dec. in each alternate row five times (36 sts.). Cast off the remaining sts.

Making Up

Press all the pieces of knitting lightly on the wrong side with a warm



[Sparrow Industrial Pictures Ltd. photo.]

iron, using a slightly-damp cloth between the iron and the knitting. Do not press the ribbing.

First sew the shoulder seams together and press them flat. Set in the sleeves and, starting at the back armhole, sew until the straight edge at the top of the sleeve is reached. Break off the wool and start afresh at the front armhole edge, again sewing until the straight edge of the sleeve top is reached. Gather along the straight top of the sleeve, regulate the fullness, then sew the sleeve to the shoulder edge and press it carefully. Sew the sleeve and sides in one continuous seam and press them flat.

Front Facings

Cut two strips of satin 2in. wide and as long as the fronts (17in.), allowing turnings at top and bottom. Pin them to the front edges with the right side of the satin against the wrong side of the knitting. Tack each firmly and machine stitch it in place, taking care not to stretch the knitting. Press it back, turn the hem, and stitch close to the fold (Fig. 1).

Measure the neck and cut a strip of satin 2in. wide and three times the length of the neck. Fold the satin in halves and arrange it in even pleats. Tack the right side of the neck edge over the pleats so that they project a trifle more than ½in. Place a narrow strip for facing inside the neck and stitch it by machine on the right side close to the knitted edge. Trim off the surplus edge on the wrong side, press the facing down, turn a hem, and stitch it down by hand (Fig. 2).

Make a similar finish at the cuffs, cutting two strips 2in. wide and three times as long as the cuff measurement.

The tie strings are also made of satin. Cut a strip about ½in. wide and 36in. long. Stitch the long edges together to form a tube. Sew a bodkin or tiny safety pin to one end and push it through to turn the material right side out. Neaten the ends and tie single knots. Cut the strip into two strings, making one a little longer than the other. Attach the cut ends one on either side of the neck.

Put dress fasteners on the two fronts, closing the right over the left. Sew two small decorative buttons on the right front facing.

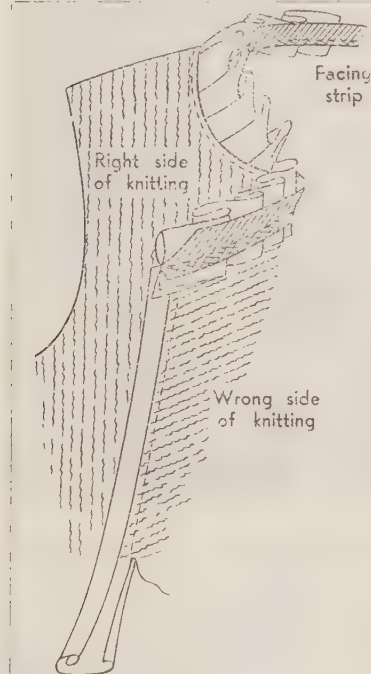


Fig. 2—Neck facing.

An Easy Test to Identify Fibres

THOUGH it is well known that woollen articles need special care in laundering to keep them in good condition, it is not always easy to distinguish between wool and other fibres made to look like wool. As the use of the wrong treatment in laundering can spoil fabrics, it is important to be able to recognise types of fibres from which a fabric is made. Some of the synthetic wools on the market at present are made almost entirely of rayon. One type of rayon fibre, celanese (or cellulose acetate), which is used principally for satins, taffetas, and crepes, requires careful handling, as it melts if a too-hot iron is put on it, and if nail polish remover is spilt on it, the fabric dissolves. The appearance of a fabric is not sufficient guide for deciding whether it is made from cellulose acetate, other kinds of rayon, or from natural fibres. The label attached to the fabric or made-up garment should always be examined, as

it frequently shows the kind of fibre and the correct treatment in laundering.

A reliable household test to identify a fabric can be made by burning a few threads from the material. Fray out some threads, say, about 2in. long from the lengthwise and crosswise threads of the fabric, but keep the two lots separate, for sometimes the lengthwise and crosswise yarns are made of different fibres. Shot taffeta is sometimes made of cellulose acetate threads one way and of threads of another rayon in the other direction, as one dye bath can then be used to produce the two colours. A satin or a crepe fabric may be made of two kinds of yarn produced from different fibres. Hold the little bunch of threads in one hand and light their ends from a match. (It is easy to put out the flame before it reaches the fingers.) The appearance of the ash formed by the burning threads and the

smell the burning causes will identify the fibre.

Wool when burning gives off a smell like that of burning feathers, and the ash left forms a small black ball or bead at the end of the remaining fibres. This ash may be crushed easily between the fingers. Other animal fibres, such as camelhair and silk when burnt give the same sort of smell and ash as wool and require the same care in washing as wool. Silk can be distinguished from wool by its appearance.

Cellulose acetate when burnt produces a black ash which runs together into a bead in the same way as wool ash, but the bead is hard and cannot be crushed between the fingers. The smell, when it is detected, is like the smell of vinegar. No other silky-looking material gives these results when burnt. Viscose rayons burn rapidly and leave a very fine, grey ash which is hardly noticeable.

—EDITH G. McNAB,
Rural Sociologist, Dunedin.

Iodised Salt as a Precaution against Simple Goitre

SIMPLE goitre, probably the most easily-, quickly-, and cheaply-preventable of all diseases, nevertheless is still an important health problem in some parts of New Zealand. In this article Evelyn E. Moore, Rural Sociologist, Department of Agriculture, Auckland, traces the history of the disease and describes how its cause was found to be an iodine deficiency in the body, a condition which can be prevented by the use of iodised salt in the diet.

MANY years ago it was known that a sufficiency of iodine was effective in preventing simple goitre, which occurs chiefly in areas where the soil and water, and therefore the food grown there, are deficient in this mineral. That this deficiency could be rectified easily if everyone used salt to which minute quantities of iodine had been added was also well known. Yet, though health authorities have been advocating the use of iodised salt for more than 25 years, about half the salt being sold, especially for culinary purposes, is still uniodised. That may be partly the result of the misconception that the use of iodised table salt is all that is necessary to prevent goitre, but, especially if foods are well seasoned before being served, very little salt and therefore iodine may be eaten in this way. Children in particular frequently take little or no extra salt with their meals—in fact, they are often discouraged from forming this habit by their parents.

Goitre can be Serious

How serious goitre can be has not always been emphasised sufficiently. Though it is seldom fatal, it can be responsible for much sickness, ill health, and fatigue without being recognised as the cause of the illness.

Simple goitre is an enlargement of the thyroid gland, the two lobes of which lie on either side of the windpipe between the collarbone and the Adam's apple. This gland is essential for normal health and life, as it is one of the key regulators of growth and development. It also controls the rate at which the body uses foods, especially energy foods, and helps to make the entire glandular system work together smoothly. To carry out these important functions the gland excretes into the blood a substance called thyroxin, which is carried to all parts of the body, including the other glands, where it exerts its regulatory effect.

The thyroid gland requires iodine for the formation of thyroxin, which is why a sufficiency of iodine in the diet is necessary. As some iodine is unavoidably lost from the body in various ways every day, further supplies must be obtained so that the gland's store of this mineral may be kept full. Research workers have shown that this is best accomplished by the daily consumption of small quantities, for, though the thyroid gland is capable of absorbing and storing sufficient iodine taken in one large dose for use over several months, the

bodies of some people do not tolerate it in such large amounts. The quantities taken in iodised salt or food do not produce harmful reactions in the consumer, they are used more economically, and are not harmful to those who have an enlarged thyroid gland or goitre, as single, moderately-large doses sometimes are.

Symptoms of Disease

If the body does not obtain its daily requirement of iodine from food or water, the thyroid cells become overactive and, as though seeking to obtain more iodine by increasing in size, the gland swells and so produces the condition known as goitre. If it swells sufficiently, as it does when the iodine deficiency is chronic, it may affect the person's breathing or become infected. Other changes may occur when the iodine deficiency is greater or when the body needs more thyroxin, as it does during growth and pregnancy. These changes include a reduction in the rate at which food is used to produce heat and energy, an impairment of mental efficiency, and a lowered resistance to disease. Consequently the person with severe goitre often finds difficulty in keeping warm, tires easily, or suffers from frequent colds or other infectious diseases.

In many cases victims are fortunate and may live a normal life unaware that they have goitre, but about 15 per cent. of all who have simple goitre may suddenly develop some form of toxic goitre, which requires urgent and sometimes prolonged medical treatment. In these cases the thyroid gland becomes hyperactive and excretes excessive amounts of thyroxin, so that

the stores of iodine, which are present in the thyroids of even iodine-deficient people, become further depleted. The excessive thyroxin produced by the overactive gland or toxic goitre causes the body to expend energy wastefully, so that the patient often becomes thin, nervous, and easily exhausted and has cardiac palpitation.

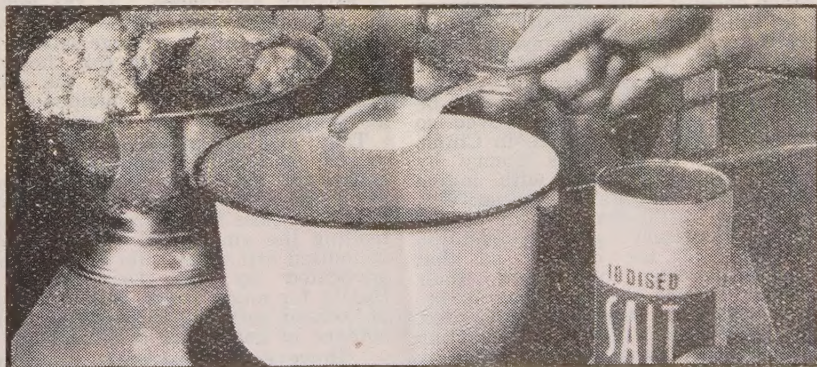
The consumption of thyroxin or thyroid preparations by people who mistakenly believe it to be an easy and efficient way to lose weight may also cause these symptoms with varying degrees of severity. Therefore the use of such preparations is most unwise except under the supervision of a doctor, who can control dosage so that no ill effects are produced.

Supplementing Iodine Consumption

Several methods have been suggested for supplementing iodine consumption in communities which do not obtain sufficient from the food. These include the enrichment of the soil with fertilisers containing iodine (an expensive and not always an effective method), the addition of iodine to the water supply, the regular addition of seaweeds and fish containing iodine to the menu, the use of cod-liver oil or iodine tablets, and the addition of iodine to all the salt sold for culinary and table use.

The average person consumes regularly about 4oz. of salt each day. Not only is it used in the preparation and cooking of most food eaten, but it is taken for granted that salt will always be on the table when a savoury or meat dish is included in the menu. If this salt, especially that used for cooking, contains infinitesimal amounts of iodine (the amount required is about one part in twenty thousand), everyone will be sure of obtaining enough of this mineral. The suggestion that iodine obtained in this way is not as useful to the body as that obtained directly from foods such as seaweed and fish is quite incorrect, and the associated idea that such foods should therefore be used frequently even with iodised salt has no evidence to support it—in fact, edible seaweed preparations cannot all be relied on to supply iodine, as in some cases it is lost when the seaweed is treated to improve its flavour.

The only other foods which can be relied on to supply significant amounts



Iodised salt should be used to replace ordinary salt in all normal cooking.

[Sparrow Industrial Pictures Ltd. photo.]

PRECAUTIONS AGAINST GOITRE . . .

of iodine are sea fish—particularly shellfish and seaweed-eating fish—and fish-liver oils. Vegetables grown on soil well manured with seaweed may also be quite good sources of iodine, but only in relatively few cases is the use of seaweed for garden manure practicable.

If it is to be relied on to supply all the iodine required by the body, fish should figure almost daily in the menu—an obviously-impossible rule for many New Zealanders to follow, as fish is not only expensive but frequently is unobtainable in country districts. In any case, a diet containing so much fish would tend to become monotonous and unpopular unless care and ingenuity were used in its preparation. Meat is more readily available, cheaper, and in other respects at least equally nutritious, so it would seem unwise to overemphasise the importance of fish in the diet as a preventive of goitre.

That leaves the use of iodised salt as the most sensible and safe way to supply iodine, for it has been shown that goitre can be practically prevented in this way.

History of the Disease

Man first used iodine to combat goitre many thousands of years ago. To treat "tumours of the neck" the ancient Chinese found burnt sea sponge effective. The use of burnt sponge as a remedy for goitre seems to have been world wide, as it is frequently mentioned in the writings of medieval European physicians. Their ideas about the cause of this disease, however, are often fantastic in the light of modern knowledge. For example, Wharton, who was the first anatomist to describe the thyroid gland, suggested that it fulfilled a cosmetic function in women, as it gave grace to the contour of the neck. As the prevalence of the disease in mountainous areas became known the theory that it was probably caused by some peculiarity of mountain or snow water became firmly established and even now is heard quite frequently.

Iodine itself was not discovered until in 1811 Napoleon, cut off from his supply of Chilean saltpetre which he needed for gunpowder, ordered his scientists to find a substitute. The mineral was accidentally isolated by a French chemist while burning seaweed in an endeavour to find the required substitute. Shortly afterward a Swiss physician, Dr. Coindet, reading of the Frenchman's discovery, made a brilliant guess—that this mineral might be the one thing which had proved so helpful in preventing goitre in China. He hastened to test his theory by treating goitre patients with iodine and attained remarkable success. Unfortunately, little was known of the amounts necessary for the prevention and cure of the disease, so that physicians often overdosed their patients, causing simple goitres to become toxic, and many patients died. The use of iodine for the prevention of goitre fell into disrepute for many years and the older theories—that it was caused by some substance present in the water or food, or even by germs

—held sway. Not till the beginning of this century did iodine deficiency finally become recognised as the primary cause of goitre.

In America, Switzerland, New Zealand, and other countries where the disease existed, experiments were carried out, all proving the remarkable efficacy of iodine in preventing the disease. In America 5000 children in Ohio, one of the States where goitre was prevalent, were examined and half were found to have goitre. Chosen at random 2000 of the children were given regular doses of iodine for four years. Re-examination showed that not only had goitre been prevented in those not already suffering from the disease, but 60 per cent. of those who had had goitre had recovered; conversely, of pupils free from goitre at the beginning of the experiment and who did not take iodine, one-third had developed the disease.

Iodine's effectiveness in the treatment of goitrous animals was also shown strikingly. In certain areas litters of pigs were born hairless, settings of eggs would not hatch, and young animals frequently died at birth. Dr. Marine, who was largely responsible for the earlier experiment, advised the people to use iodine, and in a very short time the conditions were cured.

In certain areas in Switzerland the use of iodised salt was made compulsory. After a lapse of three years no congenital goitre was found among children whose mothers had used iodised salt, compared with a 50 per cent. goitre rate among newly-born babies before the adoption of the prophylactic measure.

New Zealand Investigations

In New Zealand an extensive investigation was made by Hercus, Benson, and Carter in 1925. They found that goitre occurred most frequently in New Zealand, as in America and Switzerland, in areas where the food and drinking water were deficient in iodine, and that preventive treatment of school children by the administration of iodine in milk was successful. Investigating the iodine content of New Zealand soils, they found that river beds and alluvial flats where leaching of the soil occurred contained little iodine, while areas underlain with volcanic rocks contained it in relative abundance. As the iodine in vegetables and other food was found to depend to a large extent on the iodine content of the soil, the type of soil was often one of the chief factors affecting the incidence of goitre throughout the country.

They also investigated the use of iodised salt for the prevention of goitre, and the results of these, as well as of more recent experiments, were used as a basis for the regulations controlling the amount of iodine present in iodised salt today. Its use has been advocated by the Department of Health for many years, and as the use of iodised salt has increased, the incidence of goitre has diminished.

However, several other types of goitre may develop, and these require radically different treatment. In fact, once goitre has developed,

and especially if it has been present for some time, its diagnosis and treatment should be entrusted only to a doctor.

At present, with goitre more or less under control and the method of prevention readily available, there is a tendency to regard the situation with a complacency which is not warranted, but in certain areas of New Zealand a considerable amount of easily-preventable goitre still occurs. Perhaps that is the result of the development of certain prejudices against the use of iodised salt in cooking.

Iodised salt can be used to replace ordinary salt with complete safety and success in all normal cooking processes and has no harmful effect on the nutritive value of the food. If it is sprinkled directly on vegetables which are to be steamed, they may sometimes become slightly brown or may develop brown spots where the salt has not dissolved, but that does not detract from the value of the food. The decomposition of some of the iodide in the salt, with the formation of free iodine, may have a similar effect on vegetables preserved with salt, so it is advisable to use uniodised salt for salting vegetables. In any case, preserved vegetables should not be expected to provide significant quantities of any of the essential nutrients, their greatest value being in the addition of variety to the winter menu; from the nutritional point of view it is better to eat all such vegetables when they are fresh, preserving only surpluses which might otherwise be wasted.

There is no scientific foundation for the statement that butter should not be made with iodised salt. Iodised salt makes perfectly good butter—in fact, it has been used by some butter factories—and, though the amount of iodine present in such butter may not contribute significantly toward the daily requirement, it does no harm.

Considerable quantities of ordinary salt are still sold in shops, so the housewife should always be sure that she does get iodised salt.

The consistent use of iodised salt is probably the easiest and most dependable method of preventing simple goitre, but it should be used for both cooking and table use, for it has been shown that the consumption of iodised salt only at the table is not a reliable way of obtaining sufficient iodine. Even in districts where goitre is not prevalent that is a wise precaution, for it cannot do any harm and it may be the means of preventing goitre in the small percentage of cases where the requirement for iodine for some reason is above average—for example, in rapidly-growing children or in case of severe illness.

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